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ABSTRACT

The use of microforms in academic environments has become a general source of concern to all those involved with it. To some extent, the issues underlying the concerns of these groups can be summarized as a question: How can an academic library achieve full benefit from microform media? To develop information and to probe the difficulties of managing and using library microforms, a conference was held at the University of Denver in December 1970. The overall perspective of the conference treated the library administrator as a mediator between competing interests and forces that are operative in the sphere of academic microform applications. The purposes of the meeting were to foster understanding and use of microform technology in academic libraries, enhance the utility of educational microforms through the exchange of ideas, and inform the academic library community and industrial sector of microform techniques, systems and requirements in an academic setting. Taken as a whole, this document reports constructive comment for the development of more effective microform utilization in the academic environment in differing situations. (Author/SG)

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REPORT OF CONFERENCE

(2)

MICROFORM UTILIZATION: THE ACADEMIC LIBRARY ENVIRONMENT

held at
Denver, Colorado

7 – 9 December 1970

(3) Sponsored by:
The University of Denver

(4) Supported by:
U.S. Office of Education

Conference Chairman: James P. Kottenstette

Editor: Alta Bradley Morrison

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April 1971

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FOREWORD

The use of microforms in academic environments has become a general source of concern to all those involved with it: library administrators, equipment manufacturers and publishers, and microform users. To some extent, the issues underlying the concerns of these groups can be summarized as a question: how can an academic library achieve full benefit from microform media? Despite their obvious economic advantages, such media have been very difficult to manage and use.

To develop information and to probe the difficulties of managing and using library microforms, a conference was held at the University of Denver in December 1970. The overall perspective of the conference treated the library administrator as a mediator between competing interests and forces that are operative in the sphere of academic microform applications. In the first place, the administrator must deal with library scientists and technologists who generate new solutions to problems of acquisition, storage, and retrieval of information in which microforms play an increasingly important role. At the same time, the administrator interacts with the microform industry which has its own--usually economic--concepts of the need for new materials and equipment for the academic environment. Finally, the administrator has contact with users whose requirements demand satisfaction as they attempt to employ microform media. The library administrator must integrate and balance this combination of forces and interests.

To that end, a group of library administrators from colleges and universities was selected to consider statements from the technical, publishing, and user communities. For the first time, these competing interest groups and the administrators could mutually consider academic microform utilization. Both the specialists' statements and the deliberations of the administrators themselves are recorded here. Taken as a whole, this document reports constructive comment for the development of more effective microform utilization in the academic environment in differing situations.

ACKNOWLEDGEMENTS

The General Chairman of the Conference wishes to express his deep appreciation to the United States Office of Education for the financial support which made this conference possible and, particularly, to Mr. James E. Prevel who encouraged and fostered the concept of such a meeting.

Acknowledgement is also made to the numerous industrial firms and publishing houses who, through their representation, so willingly contributed to the development of an informative and meaningful program; to the representatives of numerous educational institutions, federal agencies (both U.S. and Canadian), and to outstanding microform specialists for creative and imaginative contributions to a difficult subject.

Finally, appreciation is expressed to the entire Staff of the University of Denver's Microform Studies Group for their eager participation in all phases of the planning and execution of the conference activities.

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Larry Block

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Karl Klessig

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Jeffrey Pemberton

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James Kottenstette

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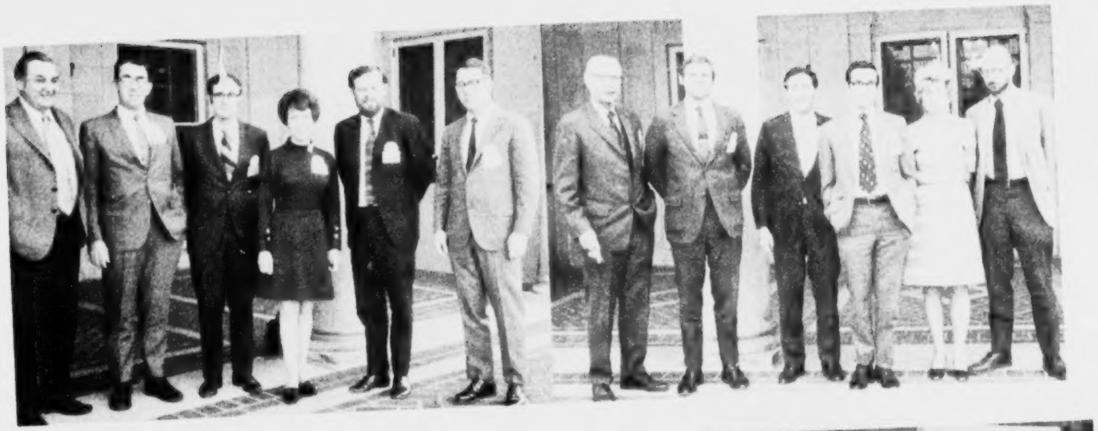
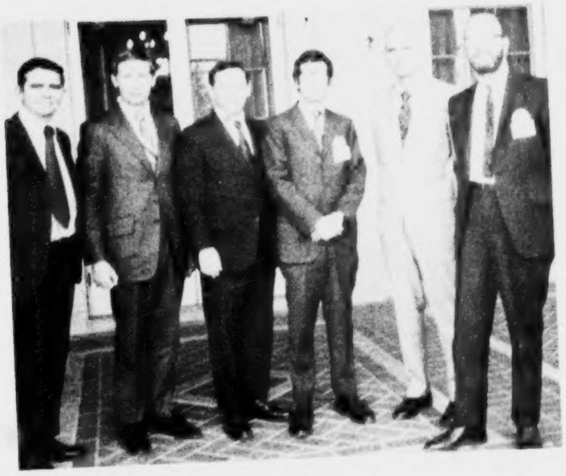
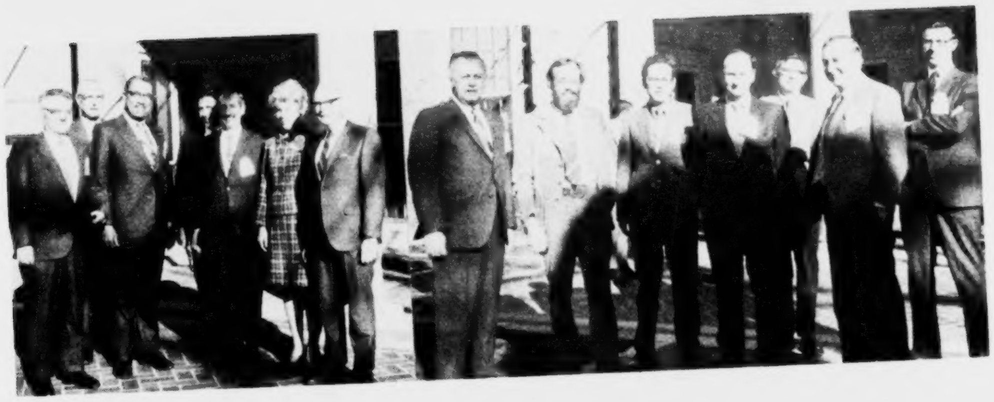
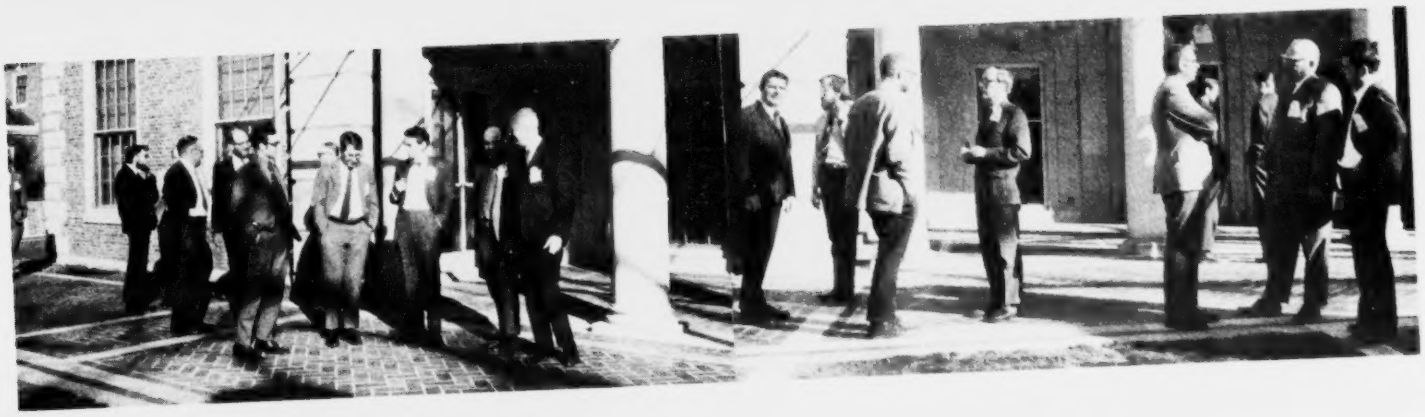
Integration thru Bibliography
Present Microform Access
Accidental Encounter
Card Catalogs
Other Non-Print Forms
Other Material Classes
Material by Category
Multiple Systems
Standard Indexing
Regional Centers
Additional Comments









MICROFORM UTILIZATION: THE ACADEMIC LIBRARY ENVIRONMENT

I. INTRODUCTION

Statement

This Conference on Microform Utilization, focusing on the environment of the academic library, was held in Denver, Colorado, December 7th through 9th, 1970. The meeting was sponsored by The University of Denver, and supported with contract funds by the U.S. Office of Education, Bureau of Research. For a number of years, the Office of Education has supported research to determine the utility of various microforms in education; this meeting was funded to bring together representative individuals from the library community of higher education to assess present problems, to stimulate contributions from individuals having differing microform experience, and to disseminate information to the academic library community as a whole through the publication of this report. The formally stated purposes of the meeting were:

> "To foster understanding and use of appropriate microform technology within the academic environment wherever it can prove beneficial; to enhance the utility of educational microforms through exchange of ideas; to mutually inform the academic library community and the industrial community of microform techniques, systems, and requirements in an academic setting."

* * * * * * *

Selection of Participants

Mr. James P. Kottenstette of the University of Denver was the General Chairman of this conference. Under his direction, the Staff of the University of Denver's Microform Studies Group reviewed the objectives and established the general criteria for conducting the meeting. Funds permitted selection of between 50 and 70 individuals to meet together and exchange ideas. After considerable discussion, it was agreed that the most appropriate and effective assemblage, and the one that would be most likely to yield the greatest return for an expenditure of time and money, would be composed one-half of administrators from college and university libraries (in some cases their representatives with first-line authority for decisions regarding microforms); and one-half of specialists from industrial, governmental, research, and private areas. For the library administrators (the target group for this conference), it was determined that all would be selected from schools which offer library science as part of their curricula; that library administrative representation from all geographic regions of the United States would be attempted; that schools of all sizes would be included; that there would be a majority of schools offering the Master's degree in Library Science, but that both Baccalaureate and Doctoral-degree schools would be included; that within these limits of representation, the schools selected for invitations would have contributed information to the Conference Chairman indicating that they were positively involved with the use of microforms in their libraries, and that this involvement was significant in relation to their total library holdings of all materials. After careful study, 37 schools were invited to participate through their library administration, and another two were represented by specialists making presentations to the conference.

Specialists who were invited to participate in this meeting included two groups: (1) those who would make presentations to the assembly, and (2) those who could make significant ad-hoc contributions from the floor. Of those making presentations (not formally prepared papers, rather "talks"), some reported upon research developed and supported by the U.S. Office of Education; others advised of special and significant current and planned activities relating to microforms; some presented information regarding the micropublishing industry as it relates to libraries; others told of interests of various associations in micro-publication activities; and some focused upon the user, the essential element that all participants recognized as the key to acceptance and widespread utility of the microform medium in academic situations.

Scope of the Conference

It was decided early that the meeting should be of three days' duration to insure adequate time to discuss the subject matter, which is very broad, covering the entire operation of a library. The library's position in providing microform services is complicated by all of the problems attendant upon increased current services to patrons and, simultaneously, the "intrusion" of microforms' new, diverse, unsettled, rapidly expanding proliferation of materials, systems, and equipment, into an already-established and on-going library system. It was determined that each of the three days of the meeting would cover one broad area of these problems (although often overlapping): the first area included library technology as it is affected by introduction of microforms into its functioning, and the changes in activities and methods this occasions now, and can be expected to occasion in the future; the second area included the kinds of microform materials that might be expected to appear for use in libraries, what these materials are in content and physical makeup and what they may likely be in the future, the problems they will impose upon libraries to provide services, as well as the attendant equipment and facilities necessary to use these materials; the third area included problems associated with the individual user of microform materials, how to meet those requirements he brings to the situation as a person, how to anticipate his needs, adapt to his interests, and serve the individual whose information needs are the main reason for the institutional library's existence. The three days, then, were formally planned to consider:

> Library Technology--New Uses of Microform
>
> Materials Published in Microform--Their Changing Nature
>
> The User's Requirements--Satisfaction in the Library Environment

Conference Format and Schedule

The conference was convened at the Phipps Conference Center of the University of Denver beginning at 9:00 o'clock on Monday the 7th of December 1970 by Mr. Kottenstette. It was dismissed by him at 5:00 o'clock on Wednesday, the 9th of December 1970. Each morning of the meeting, specialists presented information to the participants assembled; these are given in Section II of this report. Session Chairmen serving these morning activities were:

Margaret K. Goggin of the University of Denver
Robert C. Sullivan of the Library of Congress, Washington
David G. Nevin of Washington University, St. Louis

During the afternoon of each day, the general assembly discussed those problems which were considered to be of most interest to participants and, in their considered judgment, to be most crucial and pressing for early solution. During the afternoons, panels of individuals (who had evidenced interest in particular subject areas) were assembled at the front of the conference meeting room along with the Chairman to aid him in developing the trend of discussions. The Session Chairmen for these afternoon activities were:

Ralph H. Hopp of the University of Minnesota
David M. Crossman of the University of Pittsburgh
Leo Cabell of the University of Colorado

Certain special presentations were given during the lunch hour each day: The National Microfilm Association's program on Microform Technology was presented by Mr. Lew Zeh; a presentation on reader evaluations was made by Mr. Robert A. Morgan; and a presentation of microfilm's history, as well as current classroom applications, was given by Mr. Thomas Lee. Comments on these special events are given in Section V of this report. The Conference Program, which was part of the advance information to interested individuals, and which was used during the meetings, follows this section of this report.

MONDAY

1
9:00

Welcome to the University of Denver
Morris Schertz, Director of Libraries

Opening Remarks, U.S. Office of Education
Merle Ogle, Acting Regional Commissioner

FOCUS: LIBRARY TECHNOLOGY – NEW USES OF MICROFORM

2
9:30

Morning Session Chairman – **Margaret K. Goggin**

CONTENT: Presentation of microform technology, current and potential.

Presentations

An Overview	Library Systems	Specialized Microform Applications	Microform Standards	Bibliographic Controls
●	●	●	●	●
Carl E. NELSON	**Klaus OTTEN**	**Charles STEVENS**	**William WHEELER**	**Allen VEANER**

(10:45 – 11:00 Coffee in the Reception Hall)

3
12:30

Luncheon in the Tennis House

Presentation of a film on microform technology by Mr. Lew Zeh, Jr., of Arcata Microfilms, for The National Microfilm Association.

4
2:00

Afternoon Session Chairman – **Ralph H. Hopp**

DISCUSSION: Given an overview of microform technology, participants will consider questions:

Panelists

Sam A. Dyson
Hannah B. Friedman
Claude Johns
Albert H. Leisinger
Norman Shaffer
Francis F. Spreitzer

Questions re Microforms

Integration into conventional systems
Use with closed circuit television
Regional centers for coop activities
National bibliographic controls
Ultrafiche applications and reproduction
National guide to projects
Computer output microfilm (COM uses)
Retrieval systems with different forms
Reproduction for patron use (give-aways)
Patron browsing of microform materials
Publicizing materials availability

(3:15 – 3:30 Coffee in the Reception Hall)

5
5:00

Informal Gathering of Participants in the Tennis House

TUESDAY

6
9:00

Microform Programs, U.S. Office of Education
Lee Burchinal, Assistant Commissioner

FOCUS: MATERIALS PUBLISHED IN MICROFORM, THEIR CHANGING NATURE

Morning Session Chairman – **Robert C. Sullivan**

CONTENT: Specialists representative of the microform publishing industry discuss planning for user accommodation.

Presentations

Fiche Collections • **Larry BLOCK**	Special Collections • **Frank CRAWFORD**	New Forms • **Karl K. KLESSIG**	Retrieval • **Jeffrey PEMBERTON**	Roll Film • **Stevens RICE**

(10:45 – 11:00 Coffee in the Reception Hall)

7
12:30

Luncheon in the Tennis House
Presentation of reader evaluations as developed for the Library Technology Program of the American Library Association by Mr. Robert A. Morgan of Morgan Information Systems, Inc.

8
2:00

Afternoon Session Chairman – **David M. Crossman**

DISCUSSION: Given the presentation of library science techniques on Monday, and presentations from the publishing industry, participants will consider questions:

Panelists

Warren N. Boes
G.A. Harrer
Odette Shepherd
Allen Veaner
Donald E. Vincent
Theodore F. Welch

Questions re Microforms

Academic areas amenable to extensive use
Copying machines for all types of forms
Conversions from one microform to another
Multi-purpose vs. single-purpose equipment
Forms related to damage and useful life
Colored microforms: extent of need
Basis for use of particular form in collection
In-house filming for classroom support
Achievement of standards after definition
Loaning reading machines to patrons
Anticipating use levels for equipment
Placement of equipment within library complex

(3:15 – 3:30 Coffee in the Reception Hall)

9
7:00

Open House at Mary Reed Library, University of Denver

WEDNESDAY

10
9:00

FOCUS: THE USER'S REQUIREMENTS – SATISFACTION IN THE LIBRARY ENVIRONMENT

Morning Session Chairman – **David G. Nevin**

CONTENT: Technology, materials, and equipment must focus upon needs of the patron; therefore presentations relate microforms directly to users.

Presentations

Microforms in the Classroom ● **Dale GADDY**	The Microform Environment ● **James PREVEL**	User Behavior: Requirements ● **James P. KOTTENSTETTE**	Effective Reader Design ● **Gordon WRIGHT**

(10:45 – 11:00 Coffee in the Reception Hall)

11
12:30

Luncheon in the Tennis House

Presentation of microform applications in the classroom by Mr. Thomas Lee at Mona Shore Schools, Ann Arbor, Michigan, as developed for U.S. Office of Education.

12
2:00

Afternoon Session Chairman – **Leo Cabell**

DISCUSSION: Given the presentations on technology and on materials, participants will consider questions:

Panelists

Robert K. Johnson
W. P. Kellam
Louis A. Kenney
Donald Luck
Mary Lucy
David K. Oyler

Questions re User Needs

Personal services needed to use new medium
Philosophy of MF's role in new facilities
Satisfaction through relevance of material
Routine studies to maximize local uses
Analyses of avoidance and resistance
Creature comfort factor in satisfaction
Proximity of audio and visual materials
Centralization vs. decentralization of MF
Real need vs. convenience of printouts
Bibliographic unit from viewpoint of user
Role of library personnel in educating users
First steps to routine availability

(3:15 – 3:30 Coffee in the Reception Hall)

END
5:00

Closing of the Conference by Mr. Kottenstette

II. PRESENTATIONS: MICROFORM INFORMATION CONTRIBUTED BY SELECTION SPECIALISTS

Statement

The following presentations were made during the morning sessions of the three-day meeting. Where visual aids were used to explain a topic, an effort has been made to include the majority of these materials. The individuals who presented these talks to the assembly were not asked to prepare formal papers since their valuable services were generously proferred at no cost to the conference budget.

* * * * * * *

MORRIS SCHERTZ

Mr. Schertz is Director of Libraries for the University of Denver.

WELCOME TO THE UNIVERSITY OF DENVER

We welcome you to the University of Denver and to the Phipps Conference Center. This conference is devoted to microform utilization, and I, personally, have a very selfish purpose in being here. We are planning a new library and, obviously, we want to properly accommodate microforms in that new facility. I am sure that this conference will go a long way toward answering questions we have raised among ourselves on microform availability, storage, utilization, and so on. I have been told that this is a unique conference, and I am sure that it is; I am not aware of anything like this having been held in the past where we have had such expertise as is here with a full three days to spend on the specific subject of microforms in libraries. If there is anything we at the University of Denver can do in terms of your accommodations or plane reservations, or anything else by which we might make your stay comfortable, please speak to me or to Mr. Kottenstette and we will try to do as much as we can for each of you. Again, welcome to Denver and to the University of Denver, and I hope that the conference accomplishes all that is anticipated. Thank you.

MERLE F. OGLE

Dr. Ogle is the Director, Higher Education, Region VIII, of the U.S. Office of Education, Department of Health, Education and Welfare.

OPENING REMARKS FOR THE U.S. OFFICE OF EDUCATION

A member of this group asked me this morning if I were in charge of the weather. Unfortunately, the Office of Education can't take credit for the weather, though we would like to on such a beautiful day as this promises to be here in Denver. At the present time, we do not have a U.S. Commissioner of Education, but the activities do go on, and I am pleased to be here representing the Office of Education as the Acting Regional Commissioner for the Department of Health, Education, and Welfare Region VIII.

Formula for Successful Conference

Recently, I ran across a formula for a successful conference, and I believe that this group is certainly organized in such a promising manner. First, you must have a very nice meeting place, one that is conducive to free-wheeling, open-mindedness, and to creative thought. I believe that such a climate has been provided here. Second, you must have adequate time to pursue the subject matter--you must have a flexible agenda and a flexible director, and I am sure you have those things. Then, you must have the country's leading experts on the subject with which you are to deal. You certainly meet this criterian. Lastly, you should have "opening remarks" by somebody who knows absolutely nothing about the topic. So--you are off to a grand start.

Concerning your facilities here, they are excellent, and I trust that while you are here, if any of you find the time to come downtown, that you will visit with us at our Regional Office. We are located at 19th and Stout Streets on the Eleventh Floor.

Presentation for Maximum Utility

As you know, the Office of Education has been interested for some time in microforms and other related types of information storage to conserve space and reduce costs. In our own Regional Office we have a microform setup which, unfortunately (but predictably), does not get the use that we would like to see it get. Perhaps, as the result of the deliberation that you people here will achieve, we all will have a better way of presenting this form of communication; it is important to the educator, in a period of time when technology is growing so fast, that we have modern means of not only conserving the space needed for stored information, but also that we can achieve some standardization. In addition, we must present information in such a manner that maximum utility accrues for the user. I know that with the kind of experts that we have here, there will be progress in this direction. I see several people here that I have met on other occasions. It is always good to have you all in Denver and to have an institution like The University of Denver host this meeting. I know they will take care of your wants. Please be assured that if there is anything we can do at the Office of Education to facilitate your purposes here, we will be pleased to do so. Our Library Program Officer, Hank Fontaine, is here with you. If you have questions later, please get in touch with Hank and do let us know if we can help you in any way. Thank you very much.

LEE G. BURCHINAL

Dr. Burchinal is presently Assistant Commissioner, National Center for Educational Communication, U.S. Office of Education, Department of Health, Education and Welfare.

EXCERPTS FROM INFORMAL COMMENTS

It is a real pleasure for me to be here in Denver to see, first-hand, the genuine interest that library administrators from our colleges and universities have in the use of new resources and methods to further education.

It was in 1967 that the Office of Education extended its programs to include the study of microform use in educational institutions. More than $750 thousand has been used to sponsor research efforts in this connection. This was a natural evolution, I believe, from our development of the ERIC (Educational Resources Information Center) file of literature into an educational retrieval system.

Potentials of New Technology

The Office of Education has been eager to develop understanding of the potentials of using new technology in the educational process, but fully recognizes that the participation of private enterprise is vital to a functioning system and its component parts. Many interests must be integrated to achieve utility and secure benefits for the scholar from the microform medium. Library administrators are in a pivotal position to influence much of the necessary blending of interests and resources.

You have a very extensive task before you and I lend you my personal support insofar as it may be helpful. The financial support of this conference by the U.S. Office of Education is an indication to you of our shared concern relating to this promising resource for educational enrichment. I am sure your deliberations here will prove to be of great interest, and beneficial to your colleagues across the country, to the industries involved in this activity that wish to serve your interests as well as their own, and to the entire educational community. My best wishes to all of you for a rewarding meeting. Thank you very much.

CARL E. NELSON

Dr. Nelson has been pioneering in the field of microforms for almost forty years; he was associated at various times with Bell Telephone Laboratories, the Xerox Company, and with IBM. He has found time in his busy life to be Director and President of the National Microfilm Association, Director and Educational Vice-President of the Society of Photographic Scientists and Engineers, Officer of the International Reprographic Congress and now President of the International Micrographic Congress. He has written over 200 papers and a number of books, including Microfilm Technology just recently published by McGraw-Hill. He has been awarded the National Microfilm Association's highest award, the Award of Merit, and awards from the Queen of England, the Chancellor of Germany, the Emperor of Japan, and President Nixon, among many other honors. Dr. Nelson now is a private consultant in micrographic technology.

AN OVERVIEW

The one point I would like to add, Dean Goggin, is that after 40 years of working in this field, I still question whether I am competent to be a "Consultant." With this rash of higher talent being laid off in the current recession, it seems that most of them have become consultants, so we have a very interesting situation in the consulting field at this time.

People who Know the Problem

First, I would like to compliment Jim Kottenstette and Mrs. Morrison for the splendid conference they have put together and the people they have gathered together to assist with it because, to me, this is one of the best opportunities I have seen for a group of people who really know what the problem is about, to sit down and talk about it, and hopefully to come out with some good answers. We are looking forward to the results of this conference because I believe that the interplay here will do a great deal for all of us. For one who has been around for a long time in this business, all I can say is that you can never keep up with it, and you can never know all about it. It makes one just a bit humble to know that, no matter what you do, and no matter how much you try to know, you still don't know all you should; so, I think the University of Denver is doing a fine thing to develop this effort and I appreciate being a part of it.

After looking at the program (which unfortunately I did not get until the last moment because I was out of town), I went up to my quarters last night and completely revised what I had planned to speak about because, as far as an overview is concerned, everything that I would normally have included in an overview is going to be covered in somewhat greater detail by other speakers. So, if you don't mind, I am going to take just a little different tack, hoping that by doing so it will help us to set the scene for the kind of thinking that we must do to be PRODUCTIVE in what we are attempting to accomplish.

Impetus for Invention

One of the old saws that we have heard many times is that "necessity is the mother of invention." Every time I hear that, it makes me think back to my many years with research institutions. Having worked in research a good share of my life, I have realized that necessity is often the mother of invention, but, almost as often, just plain CURIOSITY is the mother of invention. In addition, there are personal motives--a little glory impels people and moves them; some kind of reward pushes us until we come out with something new and useful. However, there is something about inventions and technology, as a whole, that should be pointed out and that is simply this: You can have the best inventions in the world, they can provide the cleverest or most glamorous thing that anyone would like to see, but unless there is "a time of readiness" for them, you may just as well wait. I think the most glaring example of that statement is Leonardo deVinci's invention of the airplane. You remember the date of his time. The only basic thing he lacked to make a plane was a motor (the best kind of motor they had in those days was a team of oxen, and he couldn't very well use that for flying a plane). But then, there came a time of readiness, when all of the pieces began to fit together, and the airplane was invented when a good enough motor became available.

But remember, the basic principles had all been there long before. This is true today in many fields of science. We have technology that is much beyond our ability to conceive of a practical use for it.

A Time of Readiness

I believe that this is most significant. It impresses me that all of this is very much like the development of a child. Most of you have been parents; you have seen your children grow. How many times have you told them to wash behind their ears, and to do all the other things they are supposed to do? Well, you can plod at it, you can try, and you can push, and you can wear yourself out, but there will be no effective results until a point of readiness comes; then they will understand and do something about it. My own little daughter happened to be a very good-looking girl but she had one very bad fault. She didn't stand up straight and show herself off right. She actually let her neck stick out a little bit, like this. We tried to help her by every method we could conceive but we just could not reach her. The "point of readiness" had not arrived. It did come when she had a REASON and a NEED for it.

She fell in love with a boy who was considerably taller than she and she had to stand up straight to make herself look well beside him. (She married him later.) Take reading as another example. Children start to read at different ages. They must arrive at a point of readiness before they really can "take off" and begin to read successfully. The whole world of technology is subject to this same principle. Here are some examples.

History of Microfilm

Let's go back to the beginning. Those of you who know the history of microfilm know that Dancer in Manchester, England, tried to make microfilm right after photography was invented, and he was unsuccessful largely because the available photographic materials were not good for making microfilm; but, he kept trying. It wasn't until Scott Archer invented the wet collodion process which produced film of fine enough grain that he could make good microfilm. This was approximately 1850. It was a tremendous invention; the birth of microfilm. By the way, his first microfilm was in the form of microfiche.

Attempts to Generate a Need

But, what happened to it? He tried to GENERATE a need for it. And what did he develop? He tried trinkets, odd little things, cute little things that he thought it could be used for, but he did not find a real need. In 1853, Stewart described, almost in detail, many of the systems which we have today. He described a reader-printer. He described readers for enlarging microfilm on screens. He described the systems that could be used. He even talked about using microfilm in the library. But the "readiness" was not there. There were a lot of pieces that had to be put together, a lot of thinking that had to be done, and a lot of people had to become adjusted to the idea, and have a need for it. But years later (this is rather interesting) when the FCC was investigating the Bell System, they demanded carloads of information, among other things, and we had to dig back into all the old files which we had from the beginning of the Bell System to deliver this information to the FCC. To my amazement, we found a document dated 1903 which suggested that telephone directories be put on microfilm. We had thought that we, in this day, had discovered microfilm for such purposes, yet almost 70 years ago it was suggested that telephone directories be microfilmed. (They haven't gotten around to it yet, but they might.)

Need to Record Bank Checks

Now comes the time when the microfilm child begins to be ready. In 1922, George McCarthy had a need and there was a market readiness. There are a number of stories about how it started. I tried to ferret out just what the real story was, and Jim Arnold, who is Vice-President of Eastman Kodak in charge of this general area, confirmed what George McCarthy told me years ago. It was an irate woman whose check for $300 had cleared the bank but there was no proof of it that started it. McCarthy had had enough similar instances to believe that there was a need for recording checks as they went through the bank. So George went down

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into his basement and for the next, roughly, six years he worked on what became the first rotary-type camera. A reader came out of the same basement shortly after that. He put them into his own bank, to begin with, and then later other banks saw the value of it and soon George McCarthy had a business of his own selling a successful microfilm system. At last, here was a good PRACTICAL NEED. The optics had been available a long time. There was film (he used movie film, by the way, which was the only good 35mm film available at that time); the technology was there, and so was the need.

All Parts for Purposeful System

Other people began to press into this field; in the library field there were many who pioneered. One name which keeps coming to my mind is Binkley who was at one time at Columbia, and later with other universities as Librarian. He, among others (including myself), not knowing that anyone else was doing it, began cutting holes in 3 by 5 cards and pasting a piece of film over the hole in order to file the film and classify it so that we could find what we wanted. This was in 1931. There was a need, but it wasn't a WELL-DEFINED NEED yet. Nor was our thinking with respect to how to apply the technology sufficiently advanced, but the answer began to evolve later.

As I mentioned, banks provided the first area to use microforms in a practical way. The library became very, very conscious of these developments very early and by 1939 micropublishing was on its way. But the area which triggered a major advance in microfilm application was the engineering field. Let me come back to that later. In the meantime, the Second World War came along and there was born a new need. The Services couldn't fly all of the big bags of G.I. mail across the oceans to the battle fronts because they didn't have the airplane capacity, so microfilm began to fill the need; a real need. The letters were reduced to microfilm and V-Mail not only became one of the most successful by-products of the War but helped to advance the technology to a point

V-mail of World War II

where it could be more USEFUL. There was a need, a real need; the technology met the need and it served a good PURPOSE.

Right after the War: if you were then in the same circumstances that I was, where an entire laboratory of some 10 to 12 thousand people had been converted almost 100% over to war effort from telephone effort, you would have seen that we had accumulated tons and tons of information. We couldn't destroy it; we had to keep it and do something about it. Others had the same problem, so great effort went into finding a practical way of putting all this information away in some form that was more compact, easier to store, and use. Again, came a big surge of microfilming of documents in order to save space, protect information, and to save things which must be preserved. For example, in Bell Laboratories, even back at that time, we were paying on the order of $7 per square foot for floor space and by microfilming (although we did not destroy the records immediately) we could put the originals away into low-cost storage that cost us only $1.25 a square foot. It was considerably cheaper to put the microfilm in the file and use it. So this satisfied another need.

Problem of Information Storage

Now, this is the principle I have been stressing. The NEED has to be there and IDENTIFIED before the technology comes to the fore to be used. It was John Langan who first found a practical way to use the hole in the card approach for the aperture card. Strangely enough, while many people had cut the hole in the card before, he was the first one who was able to get a patent on it and he did it in a very simple way. Most people are unaware of just what the critical element of his patent was; it was simply that he embossed by pressure an area around the edge of the aperture (hole) deeply enough to place a layer of adhesive around the hole in the embossed area. From the opposite side he could set a piece of film in the aperture and adhere it to the adhesive layer without increasing the thickness of the card. This made the aperture

The Aperture Card

card viable, useable, and conveniently filed. The patents were filed in 1945 but not issued until the 50's, one in 1950, one in 1951, and one in 1953.

Technique to Match Specific Application

The aperture card filled an important need for a specific field at a time when it was sorely needed. Peculiar to the engineering-drawing system is the need to update drawings. It is too expensive to redraw drawings every time a change is required, so what do they do? They take the original drawing (perhaps a large one, maybe a small one, but it has on it much valuable information that has a substantial investment in time and effort). Instead of redrawing it each time as there is an updated or changed feature, the draftsman merely erases the old part, makes the change, and then notes what the change was in the change column of the drawing. This requires that every time a drawing is changed it is necessary to issue a new drawing including the changes so that the drawing file will be up-to-date. Microfilm, in an aperture card, FITS THIS SITUATION very well because each time a drawing is revised it can be re-microfilmed, put into another aperture card, and filed in place of the old card. Aperture cards provide a form of unitization--one card, one drawing. The technology fitted the need for a successful system. Microfilm has been a great savings to the Bell System--the installation of microfilm in engineering drawing areas is netting $20 million a year savings. And that does not take into consideration a lot of other things that it does for them.

Information Deluge is Real

One of the great concerns of the group assembled here is what has been described by the trite expression "information explosion." However trite, it is very real. Two years ago a group of us made a very intensive study. It resulted in a very simple bar chart, which was strikingly illuminating. Were you to take all of the information available at the time of the invention of the electric light and plot it on a scale four inches high, and then take all of the information that has been generated since the Second World War and plot it on the same scale, you would have a bar reaching 70 stories high. It has added more than another story since that time.

We also found that, very conservatively, we double our information every five to eight years. We have no choice but to find new and better ways of handling information. It forces a deep concern upon us as to what we can do about it and we all hope that out of these meetings some constructive direction will come.

COM in 1936

Let us consider an area of our science which illustrates well the principles of NEED and READINESS. The COM (Computer Output Microfilming) has gained a great deal of glamor. Back in 1936, we made a COM in the laboratory and wrote directly on microfilm. Others also did it. The oscilloscope beam wasn't as small as it is now, nor could we control it well enough. Of more importance, we didn't know what to do with what we knew how to do. In the same laboratory, we put together a computer with telephone relays; a simple one but it was a computer.

That was a long time ago and you may wonder why it took so long for those scientific marvels to reach the market. Let's go back to the COM. It had to wait for a REAL NEED. The first well defined need came when Ed Rossi put up enough money and urged the development of such a COM to help solve some of the problems of the Social Security Administration. The device was developed, worked successfully, and it appeared that we were to be moving swiftly into a new era. But what happened? You may remember that in the early 60's (I think it was 1961) Stromberg Carlson put out their SC4020. It was not until several years later that the market began to be ready for it. Today one hears more about COM than any other part of the industry.

Microfilm as a Working Tool

The 1950's were marked by a realization that microfilm was no longer a means to store things, to put them away safely, but that it could be a working tool in a system, a working system. This realization of microform as a working tool stimulated research and development. Work accelerated toward making microfilms something other than a dead storage vehicle. I see Steve Rice sitting here and I am sure he will remember that years before, University Microfilms began making a working tool out of microfilm and furnishing it to libraries. Others were doing the same thing, but this was just one area, and the world as a whole had not yet really become aware that microforms were something that could be used in an ACTIVE WORKING SITUATION. Although this awareness began to spread in the 1950's, all the right tools needed for a good working system were just beginning to appear.

The Systems Concept

During the 1960's the "systems concept" began to mature. We needed a system built around microforms to make them work. The SYSTEM, the EQUIPMENT, identification of the NEED, and the MARKET are coming together and the microfilm field is expanding rapidly. The 1960's was a great decade for microfilm. It became a genuine working tool. It grew to an industry of about $500 million annually. Microfiche first made in 1850, was reborn and heavily impacted the publications world. Dr. Joseph Goebel's original microfiche step-and-repeat camera and some of his microfiche are now in the Gutenberg Museum in Mainz, Germany, alongside the first Gutenberg printing press.

Future Uses

Now, what does the future hold? In short, we are going to have an interesting time with COM. Its uses will exceed our present imagination and be limited only by our ingenuity. The library will profit by COM. Here is another area: how many librarians would love to take all of their 35mm film, reduce it to 16mm, put it in cartridges, or change it to microfiche? Would our users miss the guessing game of which of four ways is the right one to load a roll into a reader to display it? I was amazed at a recent symposium which had some of the foremost optical men in the country attending. One of them had to load a reel of film into a reader and Murphy's Law worked. He tried four times before he finally got that film in the machine the right way. The cartridge is the answer to that and from the user's point of view it could help tremendously.

Microfiche is not the whole answer yet because you can still put that in three wrong ways. But, we can develop a technique to solve this problem by simple standard markings. Microfiche does have one very outstanding advantage; it is a form of unitized information. It can be searched and retrieved on a random basis, which usually speeds up a search.

Library Automation

I want to relate this subject to something else: we are going to hear about storage and retrieval and library automation. We can't very well automatically retrieve books; but, we can automatically retrieve microforms. We are entering an era in library history when we are going to be forced into introducing automatic retrieval methods and equipment. A point of readiness is here; a great effort is being made to define the need so a waiting technology can be applied. I have been consulting with five different companies who intend to introduce new retrieval machines. They are quite sophisticated. But, I think the time will come when we will have retrieval machines that will be much more simple, low in cost, and which will fill the library need more suitably. I am sure we are going to hear from Bob Morgan on this subject because he has one that is extremely interesting.

Film as Computer Input

New Films

Now, another thing: you have heard the expression CIM. That is "Computer Input Microfilming." Microfilm has become an input medium for entry into computers. This is moving along quite well. Several companies are working on it. Some equipment already is announced. I have just seen some most interesting new photographic materials. This is a field which is going to have some surprises in it. For years and years silver technology has been THE technology and it's been the one we have all depended on. It's the only film sensitive enough to be used in a camera successfully. Just a short three weeks ago I was in a laboratory where people had developed a material which is developed by a flash of light, which self-develops and self-fixes itself, and its speed may be able to be brought up to camera speed. This is an area that is very interesting, but do not expect it to be here tomorrow. I have never seen fundamentally new technology like this come to a

Optical Character Recognition

Remote Transmission

product stage in less than five years. You may notice that there is a common thread that has been running through all the subjects so far mentioned. The COM came when all the necessary elements were ready for it. CIM, OCR (Optical Character Recognition) will come when things are ready for them, because the technology is here. The remote transmission of information from central stores to distribution points quite remote is slowly coming. It will accelerate when we reduce the present bandwidth and the transmission speed to such a point that we can economically afford to do it. Our problem right now is not that we can't do it; we can do it with high quality. I have seen 4000-line raster pictures which are beautiful. This is very well, but what does it cost to send an image using a bandwidth on the order to 30 megahertz over a telephone line using coaxial cable or radio relay? It costs so much it can't be afforded. There will be many ways of aiding in the solution of this problem. For example, this book page is 99% white. Let's get rid of the white and just transmit black. Fine. Many people are working on it. I know that in one laboratory a method has been developed by which they can compress information by a factor of about seven. These advances may narrow the band to a point where we can transmit within reasonable cost; when we do that we can begin to bring libraries together and tie in with other information sources and spread information widely and rapidly.

Computer Storage not Practical

Our technology, as I mentioned, is moving faster than we know what to do with it. Let's take a typical case. I was at the Livermore Laboratories the other day talking with the Librarian. He was concerned about what to do with his library as it relates to the computer; they have two photo-digital computers, each one of them capable of storing 10 to the 13th bits. A trillion bits seems to be a very large store of information; but as we talked about it, only a small portion or section of one of his branch libraries would fill both computers. Many people have hoped that the computer would be the answer; that we could put all of our information on the computer and transmit or search it as required. Not for awhile yet. It takes just too much computer capacity to store all of that information.

But, the computer does have an important role. I spent some time with Dr. Hirsch in San Francisco. One of the very interesting things there was that they had in their experimental program a line hooked up to a computer in Sunnyvale through which they were searching ERIC tapes. People from the educational field were standing in line waiting to get onto the terminal to put in a search to get source information. After the visit in San Francisco, I visited many others who had made use of a computer searching service and they said it is the greatest thing they have had. They can go to a terminal, make their search, and do in a minute what it would take months for them to do in manual searching. Then they can go to the microfiche collection of ERIC, obtain the information, and use it more effectively and with much greater ease. At Stanford, where they use the computer for searching, I learned that three students had used the computer and the ERIC collection, and from it alone had written their doctoral dissertations.

Computer for Source Identification

With respect to acceptance of the use of microfilm, I spoke to at least 100 people while they were sitting at readers; I tried to get them to say something bad about the microfiche they were using but no one responded negatively. I tried to provoke them by making such remarks as "this is an awkward system," "it's terribly inconvenient," and "why should you have to work with a machine like this." They would say, "go away. We can get the information here. Maybe it isn't quite as easy to use, but we've got the information." I said, "doesn't it strain your eyes? Doesn't it make you sick to look at this stuff?" Only one girl said "Yes. When I turn the film at a certain speed, I get dizzy." But beyond that, I couldn't get them to complain about it. This was a pleasant surprise.

Acceptance of Microfilm

One thing did come out loud and clear; they preferred having something they could take home with them to study. On

Use Location a Problem

their own they suggested a small, portable reader rather than having to come to the library. If they could take it home to study that would be great. But, if they couldn't, they would take the next best. This is one of the things I think we are on our way toward solving because there is going to be a rash of small readers shown in the next year and some of them will be quite good.

Publishers Interests

Let me ask a question or two. Is putting everything into a computer store the answer? Is micropublishing of books, periodicals, and newspapers going to be the answer? Some have said that as the publishers yield to the idea that microfilm can be used and that it is not in serious competition with their printed materials, the field will open more rapidly. They worried about paperbacks when they appeared but they served to increase the market. I have an optimistic hope that the copyright and royalty problems will find fair solution, as will other associated problems. The publishers have a big stake in whatever the solution is and deserve an equitable arrangement.

Standardization? Who wouldn't like a universal reader. Everybody would like it, but I think Jim Prevel probably stated it well when he gave a talk up in Canada a few days ago. He said that quite a number of us believe that we will arrive at a family of standards rather than a single standard.

Clear Identification of Need

Is the key to progress better and lower cost microfilm equipment? Is it a country-wide network of electronic image and data transmission? Is it more computer search and better indexing such as the ERIC collection I mentioned? Is it more and better storage and retrieval methods? It is all of these. In this conference I would hope that we take the opportunity to discuss all of them, but keep in the background the thought that we can't say to industry: "We want this kind of equipment" or "We want this piece of apparatus" and so forth, unless we have IDENTIFIED A REAL NEED, a real market and have arrived at an agreement on the specifics of what we want.

We are living in dynamic times as we all know, and I look forward to the 1970's as being a time when we will see a fruition of a great many things for which we now have the technology. I hope we are able to find the right way to use it. Thank you very much.

KLAUS W. OTTEN

Mr. Otten is Manager of Products in Systems Planning for the Industrial Products Division of the National Cash Register Company. He is also an Adjunct Professor in the Department of Information Science of the University of Dayton. He has been much involved in research, his major interest being in artificial intelligence, speech and character recognition. He has published numerous articles in the Journal of the American Society for Information Science. Mr. Otten is a specialist in the design of information systems with particular interests in the use of microforms in library systems.

LIBRARY SYSTEMS

Outline: Trends Potential and Problems

I will probably have some difficulty as an engineer talking to librarians; you probably will notice a bias in my discussion toward technology. I would like to discuss with you briefly the trends in the development of microform systems, as suitable for library applications. The potential, and the problems for microform systems in libraries, will be analyzed as seen by a systems engineer, who is also a user of libraries.

Microform, as used in this context, is a generic term, which I define as any form of an optical record of information which is made in smaller than eye-legible size. It can be in the form of film or fiche, at a variety of reduction ratios. I will put forth my hypothesis about the forthcoming use of microforms in library systems, and then give you reasons why I think this will occur, probably within the next decades. By referring to a number of comparisons, I will indicate why I think these particular reasons are important.

Need for Compaction

About 20 years ago, Fremont Rider, in his book The Scholar and the Future of the Research Library, made a forecast of the "information explosion." He predicted that recorded information would double every 15 to 20 years. As a consequence, he foresaw a need for compaction of the library and he introduced the concept of microtext, a type of microform. At that time, the justification for the use of microform was seen in "compacting recorded information." Even in more recent books such as Werner W. Clapp's The Future of the Research Library, published in 1966, the emphasis was on compaction. The advantages of using the highest technically and economically feasible reduction ratios, as well as those of economical duplication, were emphasized.

Machine-Readable Libraries

In 1965, we had an entirely different view of the future library system when J. C. R. Licklider (in Libraries of the Future) forecast that, by the year 2000, libraries would be primarily what he described as procognitive systems; that is, computer-based libraries with all information stored in machine-readable form and retrieved via a system's network.

New Information's Media

I will try to convey to you my thinking on the future of the research library. The research library of the immediate future (next decade or two) could, in my opinion, very likely be a microform library. I predict that, under certain conditions, libraries will resort to microforms as major media for storage and retrieval of NEW information, that is, for the new information that is being generated from now on.

Human Plus Machine Readability

There are five reasons for this hypothesis which I submit as "conclusions" before discussing them (See Figure 1).* The first reason is the most important, in my opinion, and states that microforms can provide human-readable, as well as machine-readable, information. That means that the human-readable content of a document can also be recorded in machine-readable form and can be used for computer processing of recorded information, if needed. This is not the case for books or other records on paper, nor is it the case, at least directly, for information stored in electronic form in a computer memory. The second

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* Figures appear at the end of this paper.

Information Coding

reason is that microform permits the coding of stored information for machine retrieval as an integral part of the recording process. A third reason why new information will likely be in microform is that, unlike paper documents, microforms are fully machine retrievable and can be handled without human interaction. This, I think, is a definite advantage over paper storage. The fourth reason is that microform provides the basis for library integrity because, if machine retrieval is achieved, the information is delivered and refiled document by document rather than page by page. Finally, the fifth reason is the reason usually cited as the most important one, microform provides a basis for compact storage of recorded human knowledge.

Machine Retrieval

Library Integrity

Problem Areas

For these forecasts to become reality, there are specific developments which have to take place in certain problem areas. There are four areas (See Figure 2) in which I believe progress must be made most promptly. The first and most important relates to (1) HUMAN ENGINEERING of microform systems. A microform library system must be oriented toward satisfying the user's needs for ease of retrieval and storage. The second area where progress must be made is in the area of (2) STANDARDIZATION. This need is well recognized and therefore does not require comment. The third area is that of (3) EDUCATION on microform. The advantages, as well as the limitations of microforms must be better known by users as well as by librarians. Finally, in the area of (4) INTEGRATED SYSTEMS PLANNING, there is a very definite need for progress. Planning for the entire information flow from the source (author) to the final user (through all of the intermediate processes) is required from a systems, rather than from a component, point of view.

Justification of Forecast

My justification for the forecast of extensive use of microforms for the storage of new material has its roots in three major areas. The first two are (a) the reality of the "information explosion" which demands efficiency in storing for retrieval, and (b) the advantages of machine-readable documentation permitting "the use of computer technology" in the information chain. The third item of my justification relates to (c) the "changing role of the library" (Figure 3). I think the role of the library is changing from a "book depository" to an "information retrieval system." In the evolution of the library function, we have already gone from book storage to retrieval of relevant documents. I believe that the next decade will see a further change of the library function in which the emphasis will shift from retrieval of DOCUMENTS to retrieval of INFORMATION. To accomplish this change we must look at the library functions which deal with integrating the body of new knowledge coming from various information sources into the composite of the human knowledge that supposedly is stored in the composite of our libraries. This integrating involves the operations of updating, deleting, adding INFORMATION, not only adding documents. In relation to the individual library user, the library must permit the retrieval and communication of requested information. To do this, the library must function as the assembler and organizer of human knowledge for easy retrieval (See Figures 4 and 5).

Library Role Changing

Information coming from various sources has to be abstracted, organized, referenced in systems codes, indexed, recorded in particular languages, and appropriately filed. The language used for coding must be common to the user of the retrieval system as well as the user of the storage system. The physical item (document) holding the information must be prepared for storage, and then physically moved into storage.

Information Prepared

From the other direction, from the user's point of view, there must be a translation of the information request into the system's language (an abstract operation), which permits a search for what relevant information may exist and the identification of its location in storage. This leads to a search for the identified material in the physical storage system. After this is accomplished, there is a physical record retrieval operation with removal of the

Information Used

record from its location and transfer to the user either physically or in the form of content communication.

Operations: Abstract or Physical

I stress the separation of abstract operations and physical operations (See Figure 6). The abstract functions include indexing, translation of an information request into index codes, and the translation of these index codes into location codes. These are all operations that the user and librarian can perform with the aid of a computer, and it is here that computer technology can play an important role in library information systems.

Physical Functions

The physical functions involve the physical preparation and transportation of records. The recording of information, in one form or another, and the physical task of putting the resulting record in an assigned place (a transportation *process*) are parts of the physical operation of information storage. In the physical retrieval operation, first the code identifier must be matched to the physical item, the record. The record must then be transported to the point of use, it must be displayed to the user, and finally, it must be transferred back into the assigned storage location. All these physical operations, in my opinion, are primary factors determining the present operating costs and efficiency of libraries. The physical operations are the areas where microform systems will offer significant possibilities for improvement. In comparing various storage media (books, microforms, etc.) we observe that one of the primary differences in potential operation costs of a library is determined by the required mode of transportation. For a paper system we are limited to transportation by man, whereas for microform systems it is possible to retrieve by either man or machine. For information display, the conventional paper (print) form is the most convenient, but in the microform we are given a multiplicity of display techniques from which to choose. One can display on a screen, or copy page by page on paper, one can copy the entire document on duplicate film, or one can use electronic displays in connection with telecommunication.

Information Display

In listing microform advantages (in comparison with paper) as I see them (See Figure 7), the document preparation has to be mentioned first. Documents in microform can be prepared directly by computer at computer speeds (COM technology). This feature becomes more important as the origin of information moves from an individual source (author) to the output of a computer (computerized editing). Perhaps the most important advantage of microform is that it provides information in both human and machine-readable form. In the area of transportation, microforms offer advantages not only in storage operations, but more importantly, in retrieval operations. Not to be ignored is the ability of microform to maintain document and library integrity, which is associated with ease of copying on a document (rather than page) basis, and to provide inexpensive duplicates for use. Retrieval advantages of microforms include the ability to encode and record simultaneously machine-readable and human-readable information; the machine-readable encoding allows fast machine retrieval of documents and reduces the required physical effort. Microforms permit fast retrieval of individual pages by man or machine, and there are display advantages which appeal to the user. He has a choice of direct display by paper reproduction or image projection or remote display via modern telecommunication facilities.

Computer for Document Preparation

Fast Retrieval

I have tabulated certain criteria for evaluation of a library's effectiveness (See Figure 8). As I see it, there are three primary areas of judging the effectiveness of libraries. The first is connected with the ability of a library to integrate NEW knowledge in retrievable form with what is already stored: to update, replace, and add new documents. This is primarily a matter of organization, indexing, and physical expansion of the file. The second area is the ability of a library to provide the user with the desired service. The ability of libraries to adapt to changes in user service demands will be a determining factor. There will be a change from DOCUMENT access to specific INFORMATION access. We see a need for fast access to many documents which may contain the desired information.

Criteria for Evaluating Library

In this process, it is necessary to maintain library integrity. The ease and economy of microform copying permits this. In providing the retrieval service, the human engineering associated with information display and the interaction of man with the stored information must be efficiently designed.

Cost Factors

The third, and generally the most important, area is the economy of operation. Criteria for matters of economy center around the cost per successful retrieval action, as well as the cost for each addition to, or change in, stored information. These costs are difficult to assess, but they decide ultimately on the practicality of a system. Microform, which can be implemented in a variety of forms, allows cost advantages for a wide range of different operating conditions.

Need for Speed

I do want to point out one additional factor which strengthens the position of microform (even though this factor was indirectly introduced before). There is a relationship between the size of the file, or library, and the retrieval time required by the user (See Figure 9). As libraries increase in size, it becomes more and more important to retrieve more economically and more rapidly. An increasing amount of specific information has to be retrieved from a storage system with increasing capacity in shorter and shorter times. In the 1970's and 1980's we will see a drastic increase in the size of files, and during this same time, we will observe a change in the user's attitude; he will become less tolerant of delays in the retrieval of needed information. The user wants retrieval time to become shorter and shorter for more and more specific information. He needs his data faster and faster. Since the retrieval time is directly related to the size of the file (retrieval time increases as the file increases), better techniques must be found to facilitate service; microform appears to be the answer.

Let me summarize some of the points I made by stressing (in another way) the important differences between paper documents and microform documents, through reference to various library operations (See Figure 10). Using paper forms and classical library systems, storage and retrieval can be accomplished only by man; he always has to interact in some way. On the other hand, with microforms, the functions can be performed either by man or by machine. Storage and retrieval operations performed by machine would be feasible if systems planning had considered the use of microforms from the beginning and made use of standardized coding for retrieval. To maintain file integrity we need the copying potential of microform. With books, copying has to be done page by page; microforms can be copied document by document as well as page by page. Indexing information associated with filing of paper records need be only human-readable, but for microforms, this indexing information can be made both human and machine-readable and hence permit machine retrieval. Space requirements and handling costs are high for paper systems and are, even disregarding the use of automation and machines, low for microform systems.

Summary

I hope I have stimulated you to reappraise the future of your own library systems and to evaluate your libraries in terms of what will be required in the near and far future. Perhaps you might want to plan for microform as an integral part, and perhaps the main part, of your library in the future--before new microform information storage and retrieval systems attract your present users away. I thank you.

Microform will become major medium for "New Information" in Libraries

for five reasons:

- (1) Microform can provide human readable as well as machine readable (computer processable) record of information
- (2) Microform allows encoding for machine retrieval as integral part of recording process
- (3) Microform, unlike paper documents, are fully machine retrievable and can be handled without human interaction
- (4) Microform provides basis for Library integrity
- (5) Microform provides compact form of information storage

Otten - Figure 1. Hypothesis

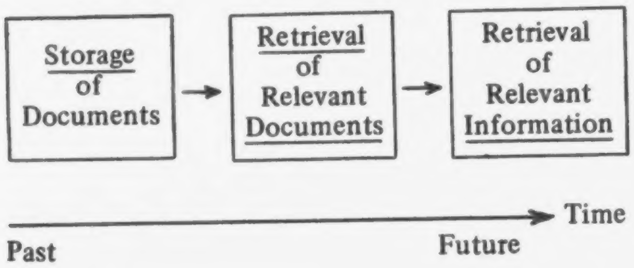
Realization of Microform potential requires progress in the following problem areas:

- Human Engineering of Microform Systems: Design of User Oriented Retrieval Systems
- Standardization
- Education: Advantages and Limitations of Microform
- Integrated Systems planning: Information Flow From Source (Author) to Final User

Otten - Figure 2. Potential

Changing Role of Libraries
From Book Depository to Information Retrieval

Primary Library Functions
During the Evolution of Libraries

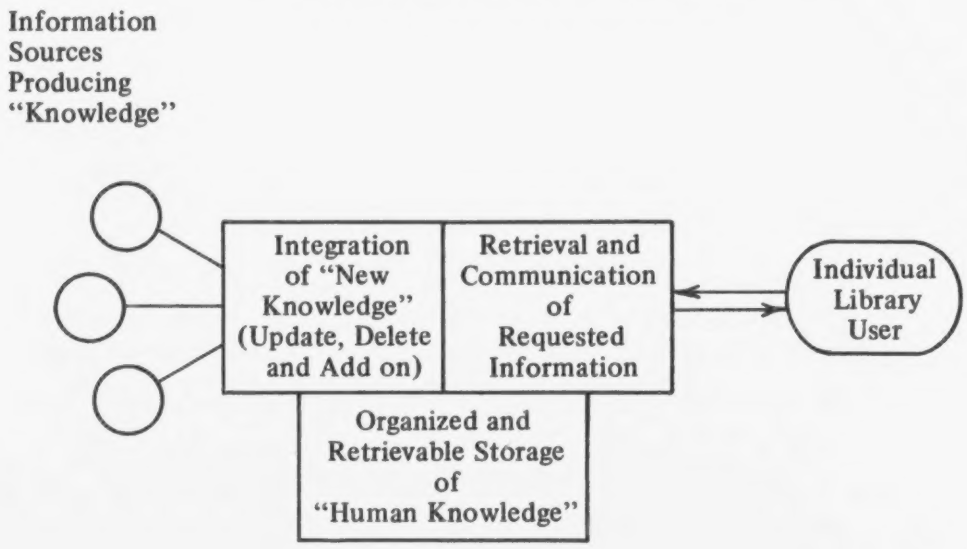


Storage of Documents → Retrieval of Relevant Documents → Retrieval of Relevant Information

Past
Future
Time

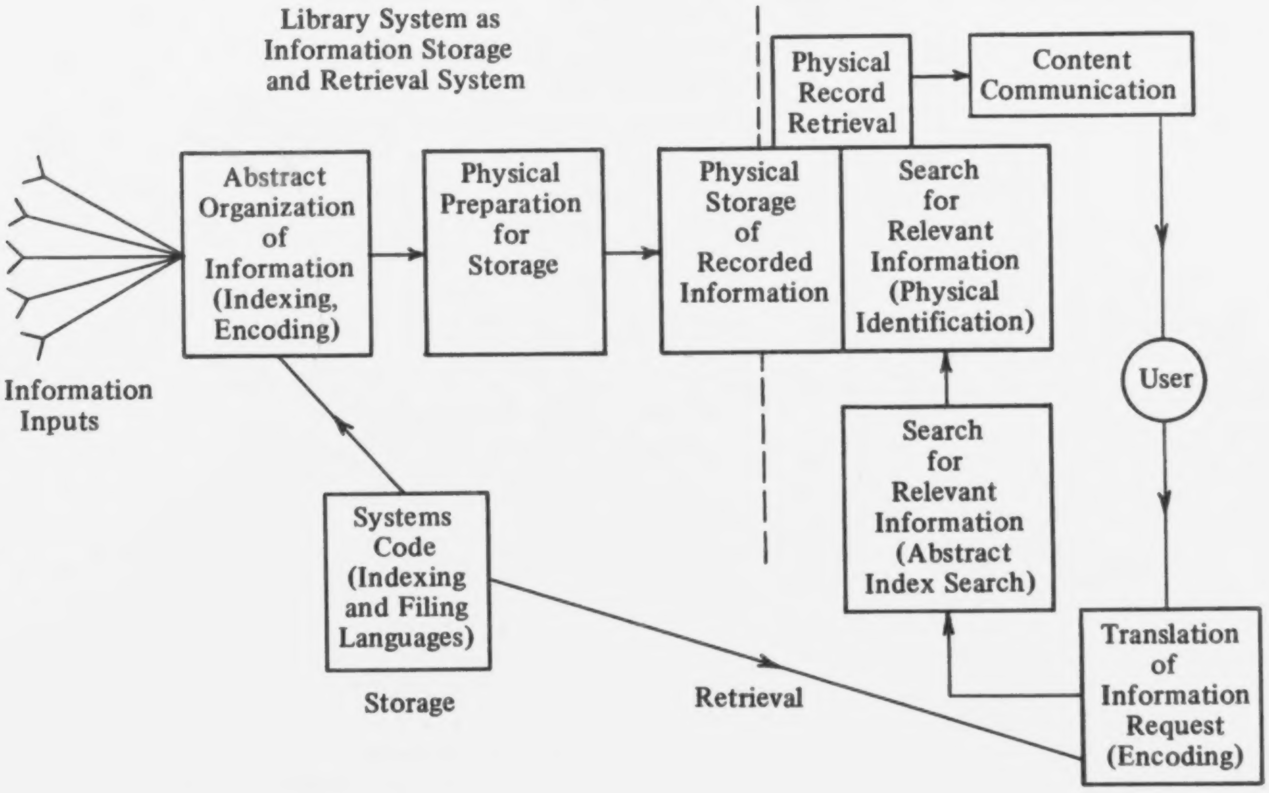
Otten - Figure 3. Changing Role

BASIC LIBRARY FUNCTIONS


Information
Sources
Producing
"Knowledge"
Integration of "New Knowledge" (Update, Delete and Add on)
Retrieval and Communication of Requested Information
Individual Library User
Organized and Retrievable Storage of "Human Knowledge"

Otten - Figure 4. Functions

Library System as Information Storage and Retrieval System


Information Inputs
Abstract Organization of Information (Indexing, Encoding)
Physical Preparation for Storage
Physical Storage of Recorded Information
Physical Record Retrieval
Content Communication
Search for Relevant Information (Physical Identification)
User
Search for Relevant Information (Abstract Index Search)
Systems Code (Indexing and Filing Languages)
Translation of Information Request (Encoding)
Storage
Retrieval

Otten - Figure 5. System

Information Storage and Retrieval

Abstract Aspects

- Indexing
- Translation of Information Request into Index Code(s)
- Translation of Index Code(s) into Location Code(s) of Stored Information

Physical Aspects

Storage	● Recording of Information	Typing, Printing Keying etc
	● Depository of Record	Transfer of Encoded Document to storage place
Retrieval	● Record Identification	Accessing of storage place and physic. Identif.
	● Transportation I	Transfer to Point of use
	● Display to User	Physical Display Copying Telecom.
	● Transportation II	Transfer back to point of storage

Otten - Figure 6. Aspects

Advantages of Microform over Paper Records in Library Systems

Document preparation
- At Computer Speeds
- In Human and Machine Readable Form

Storage
- Drastically Reduced Space Requirements
- Drastically Reduced Physical Effort for Transportation
- Document Integrity

Retrieval
- Fast Machine Retrieval of Documents
- Fast Page Retrieval (Manual or Machine Aided)
- Fast and Economic Document Copying Permits Library File Integrity: Distribution of Copies Only

Display to User
- Three Forms of Display:
  - Paper Copy
  - Image Projection (Reader)
  - Image Telecommunication (TV) (Limited)

Otten - Figure 7. Advantages

Criteria For Evaluation of Library Effectiveness

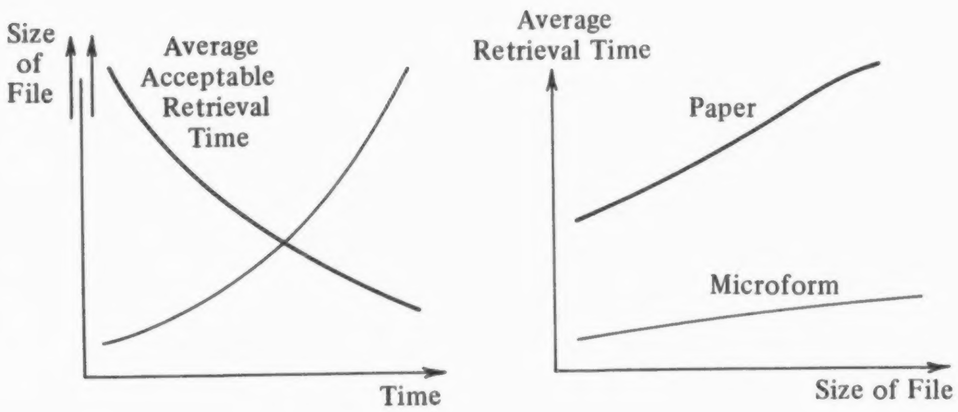
Ability to Integrate "New Knowledge" In Retrievable Form with "Stored Knowledge"
- Updating and Replacement of Documents
- Addition of New Documents
  Organization - Indexing
  Physical Expansion

Ability to Provide User With Service Considering Change in Service Needs (From "Access to Document" to "Access to Specific Information")
- Fast Access to Multitude of Documents
- Ability to Copy (to Maintain Library Integrity)
- Human Engineering of Information Display and Interaction Man - Stored Information

Economy of Operation
- Cost per Retrieval Action
- Cost per File Addition/Change

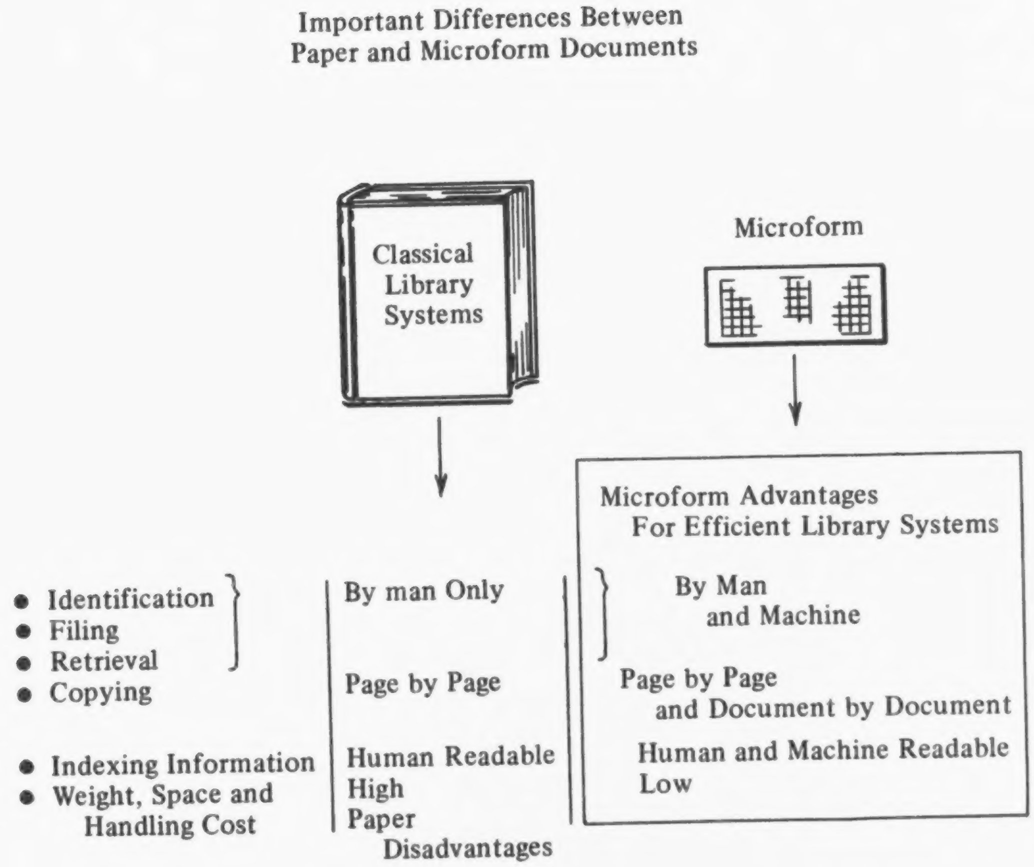
Otten - Figure 8. Evaluation

Size of File and Required Retrieval Time



Retrieval Time:
Time for Physical Search, Identification and Transfer of Document to Point of Use,
Time for Refiling

Otten - Figure 9. Size versus Time


Important Differences Between
Paper and Microform Documents
Classical Library Systems
Microform
Microform Advantages For Efficient Library Systems
Identification
Filing
Retrieval
Copying
Indexing Information
Weight, Space and Handling Cost
By man Only
Page by Page
Human Readable
High
Paper Disadvantages
By Man and Machine
Page by Page and Document by Document
Human and Machine Readable
Low

Otten - Figure 10. Differences

CHARLES H. STEVENS

Dr. Stevens received his library degree from the University of North Carolina. He has held positions in libraries at Purdue University, at the University of North Carolina, and in the United States Air Force. He is now at Massachusetts Institute of Technology, where he has been occupied since 1959. Dr. Stevens is Associate Director for Library Development, heads Project Intrex, and holds major responsibility for user services involving microform access. He is active in many professional societies, including ALA, SLA, ASIS, and NMA.

SPECIALIZED MICROFORM APPLICATIONS

Project Intrex

I would like to tell you today a little bit about Project Intrex and tell you how microform fits our story of text access and what we call "guaranteed text access" in the model library at Project Intrex. We will give you an idea of where this might lead us in the future. Project Intrex stands for "Information Transfer Experiments." It is kind of a double acronym, and I will repeat it for you: Information Transfer Experiments. When I say that to people who come visiting with me from time to time, I try to emphasize the last word: EXPERIMENTS. Most people looking for information on Intrex for the last five years have looked to us hoping that we will say "Information Transfer System"; and say, "come buy one," but it isn't so. It is an EXPERIMENTAL program. It grew out of a planning conference held in 1965 at a house somewhat like this one. I was just astonished at the similarity between this center and the Summer Study Center at Woods Hole, Massachusetts, although this center is somewhat more grand and lavish in its layout and furnishings, the whole arrangement is much the same. For five weeks we deliberated as to what experiments should be performed during the next several years that might lead to an information transfer system that would go from the 1970's on. I am not going to try to tell you about all of those experiments today. Indeed, many of you will have already read about them and, perhaps, know just as much as I do from reading about them. (I see at least a few smiling faces that seem glad to learn that I am not going to

Stresses User Access

Text Availability

Centralized Access

talk about all of them.) But, I do want to tell you about one. On an over-all basis, the planning conference participants said: stress the area of USER ACCESS TO INFORMATION. Don't let your experiments wander into those valid and important areas that are being taken up by others, of cataloging in libraries, serial control within libraries, circulation control within libraries, etc. Look down the muzzle end of the barrel; look at user access. Among the things they said specifically to look at were: look at ways of giving the user GUARANTEED TEXT ACCESS. Users who now go to academic libraries find, traditionally, that with a list of ten items, valid citations (well-copied from journal articles that have for once gotten all of the citations right), they can get perhaps three of them from the library, for a number of reasons. The thing is out to another borrower, it is being recataloged, it is out to the bindery--you know the reasons if you have done any research on your own. You know that thirty percent is a good percentage; and as users saw this happening, TRUST in the library dropped down; the lower it dropped the less likelihood the library had of getting its budgets supported by those academic departments that could best support it. So, we get on this downward spiral rather than an upward spiral in terms of services. The participants in the planning conference said: if you will provide experiments leading toward guaranteed text access, you can build that trust back up again, bring users back to the library, and build a community of interest that you really want, and that the academic community really deserves, because it is in the end better to provide centralized access than individualized access. While there are many ways in which we might provide guaranteed access, one of them would be, of course, the obvious solution of buying n + 1 copies of every item that was ever asked for, where n is the number of requesters at any one time and an additional copy to retain for file integrity (as we heard discussed in the last paper). That turns out to be a very expensive way of doing things, and a wholly impractical way. The early (not too early) report of Fussler, some 10 or 15 years ago at least, shows that in a large academic library, of all the items that are collected, only one-half

Possible Solutions

Functional in the 1970's

Transitions to New Technology

will ever be used at all, insofar as they could determine; so to collect n + 1 copies is certainly not advisable if you can't determine in advance what is to be used. Another possible solution might be to copy the item to be used at the time of use, and thereby get n + 1 copies for any item that was to be used. Fussler said that if used once it is likely that the item will be used again, so if you copy something that IS being used, the likelihood is that you are providing not only for today's user but also for a future user. That would be fine if you only knew in time for the first user that it was now time to copy it; if the item he wants is very, very large, you delay access for the user, so that too turns out to be somewhat impractical. We heard in the second paper, too, about Licklider's work with procognitive systems. J. C. R. Licklider was one of the participants in our planning conference, and one of the possibilities occurring to us was to store information that could be stored digitally, in digital form, and recover it in a timely fashion for the user. This still remains as a possibility. I am sure that we could get a very interesting discussion going between Mr. Otten, our last speaker, and Mr. Licklider as to which technology will prevail overall in the forthcoming twenty years we heard about in the last paper, and in the year 2000 as discussed by Mr. Licklider. There is certainly not whole agreement on which would be the easiest way of getting information. But, Project Intrex had to look at what could be done in the 1970 decade; at what is really possible now in terms of guaranteed access. So, we zeroed in on the use of microform techniques and we said that the user who approaches the academic library should not have to approach it only at the library. He should be able to approach it from his laboratory, from his classroom, from his dormitory, and in many places within the library itself; for in the foreseeable future, users will use library technology in a way that interlocks new technology with old; already we have heard that mentioned today in terms of finding real uses for new technology. There must be that interlocking and gradual spiraling upward of our ability to do the things we want to do in better ways. One thinks of the example, for the moment, of the telephone

Access in Multiple Forms

Scaling the Experiments

User's View of Desirability

system switching from operator service for all calls to dial service for most calls. There is no opportunity to hold up the whole system and wait while a conversion is made. So, in the library, there is no opportunity for us to disengage from the technology of books and journals, while we reach for a new technology; to disengage from what we are doing while going to something new. In our systems considerations, we said that users must have guaranteed access. In an experiment, it must be in multiple form; that is, we must follow those three forms that we were given in the last lecture. There must be hardcopy form available, there must be display copy available, and there must be film copy available to the user. We must guarantee the integrity of the file because we want every user to have guaranteed access and not just the first user; so, in terms of what we were looking for at Project Intrex, it follows very precisely the guidelines that were being set forth in the paper we heard just before the break. Experimentally, we are faced, too, with the problem of what one should do about the scaling problem. Could one forecast that, if one could provide all of these things in a very small model library, that one could take the gigantic leap forward of creating the same sort of system for a very large academic library. As Dr. Nelson brought out, the technology for doing these things is available; we need now to see the need, and to build around that need the already available technology into a viable system. But, in order to understand the user's reaction, we didn't have to create a great, large thing; we could create it small, and with a group of users that could identify themselves with that small body of equipment, we could begin to get the user reactions that we so much wanted; and it was, after all, the user that was important in the system. I have to defend MIT on that point sometimes. People look at MIT and say: "What new hardware have they built now?" In terms of Project Intrex we have had to build new hardware (and I will show you a couple of pictures of it later on) but the important thing was to learn from the user what kinds of access he really wants if guaranteed access can be provided. Will he accept a fiche copy that is his "giveaway" guaranteed access copy; must he have hardcopy and be able to write in the margins; if he has a display copy, must he have the 4000-line scan (that Dr. Nelson spoke of as being available); is a 2000-line scan suitable for most purposes; is color necessary? Those are the real questions that we are striving to answer in terms of our experiments. We then began to build experimental equipment, and I will use the word "system" because that is what it is: a group of components brought together to satisfy a need. The need here was an experimental need, and for our purposes we put together two Houston-Fearless CARD retrievers for microfiche. We added to these a rotating prism so we could look into either one of them by remote control. We added edge-finding equipment so that we could find an exact page image within a fiche and locate that very precisely, and center that image for a camera; and then we added a specialized camera to look at that image and transmit it, either to a remote viewer or to a film processing device that could be activated by that remote viewer. Then, we took on the problem that Dr. Nelson mentioned before, of transmitting this image within an academic community. The problem that he mentioned of using the very wide band for transmitting images is, indeed, a very real problem, and it is certainly real when one thinks about the distances in this area--from Boulder to Denver, from Denver to Colorado Springs, Denver to Salt Lake City, and so on. In terms of transmitting image information only within an academic community, those problems are not so crucial, and if we think about the distances involved in transmitting from here at the Phipps Center to the University of Denver, then we are talking on the order of a few miles. The costs in such a case become costs that can be countenanced and we begin to think about 4.5 megahertz lines as being within the area of real time, real economics; and here, too, Project Intrex and MIT were looking at the development of technology to see where it would bring these costs down still further; but, as we thought about it, we were thinking about transmission distances involved with consoles located within a mile radius of the centralized unit. Again, I have to digress just momentarily to say that if one thinks about transmitting microimages, one can think about back-stopping

Experimental Equipment

Local Community Transmission

Dispersed Backup Data

systems in which each node of this system has the items which will most likely be asked for at that node, or near that node, and think about using the remote text access only for items that are not usually requested in that location, so that the transmission time, the transmission queueing , the transmission backup, is used only for those items which it is not cheaper to reproduce locally. We now have the 4.5 megahertz line in locations around the campus. Then, for receivers, we had to build display terminals and film terminals that would permit us to create an opportunity for the user to get the kinds of access which we thought would be interesting and important to him. We also had to build new kinds of readers. We felt that microform reader technology was not so fully developed but that something more could be done on it. In our welcoming address this morning we heard that the Office of Education is interested in the development of readers and, indeed, they have been one of the sponsors of our microform reader investigation. We had to work on the enlarger-printer problem. Again, that one had not been solved so satisfactorily in 1965 that we could leave it to commercial developers. So, we have been active in all of these hardware areas. But, let me bring your focus back again to our intent: to look at user satisfaction and not to see how much we can do with hardware. We really have wanted to know "what was what" in terms of user behavior, and to be able to postulate from our experiments what would happen when we scaled upward. Well now, I must tell you just briefly about our text access experiment as tied to our augmented catalog experiments. We said, in the days of the planning conference, that we ought to have a system of finding information within the file that would be as up-to-date as we could make it. No longer should the user have to use a multitude of finding instruments: the card catalog, the periodical index, the abstracting journals, to do a literature search. He should be able to do all of these at one console. (I am glossing over this completely and can come back to it if you wish.) We said that the user, at the end of any augmented catalog lookup, should be able to have guaranteed text access to those items that were in that augmented catalog, and that the command from the

New Readers

User Satisfaction

Augmented Catalog

Image Presentation

System in Use

Transmission Time

console should be as simple as "output text," and that is the command we now use, so that at the conclusion of a dialog interaction with the computer (and I will show you the very briefest look at that) the user commands "output text," the computer switches its control from a digital input on one side of the campus to microform input on the other side of campus, and calls up from the Houston-Fearless CARD retrievers the image of the page called for. Now we can turn pages as easily as pushing a button or ask for film copy by pushing another button. That is essentially what we are doing experimentally (keep that word in mind "experimentally") at Project Intrex at MIT. Our users started using the system in March of 1970. The system was taken down during this past summer in order that we might make it somewhat better. The user, for a while, used to look at digital information on one console and graphic display microfiche transmissions on another, side by side, and we have now merged the two so that he doesn't have to shift his eyes to look from one console to the other in order to switch from digital information to analog transmissions of microfilm information. We put the system back into operation in October of this year, and so (with this being early December) we have two months of actual use with real users looking at the real augmented catalog as an experiment, and real text access as an experiment. Dr. Nelson has pointed out that what I am saying to you as a "kind of wondrous happening" is to him ancient history. He has seen it in several places in earlier years. The group of users at MIT are very excited about it, and I commend it to your attention even as a "Johnny-come-lately" kind of experiment. Queueing up of people waiting to use the terminals is not a severe problem as yet because, on the MIT campus, we have many consoles that can give computer access, more than thirty of which can be active at any one time. We have six ports for our display consoles, but our user group is still so small that the queueing problem for display consoles is not great. The finding time for getting any one copy out of the file and transmitting it to the viewer is, for the first page, about 10 seconds and, for subsequent pages, about 4 seconds. Once the page is received at the viewer, the image is held at the viewer; then all the finding equipment and transmission equipment is released for other requesters; so, we do not tie up one series of gear for only one user, but one series of finding equipment can be used by several users. Right now we think that our queueing problems may limit that to around 10 very active users, but this doesn't seem to be disproportionate to the cost of regenerating that equipment. That equipment, again, is something you should think of as being experimental now, but if we switch from a Fearless, to a Mosler 410 system, the number of users could go up proportional to the queueing apparatus that was used to back up a Mosler 410 system, so one shouldn't think of it as being user limited. Finally, getting away from that, I would like to mention briefly (as it has been mentioned in the abstract of my talk) that in the Model Library we are giving users guaranteed access to a much larger selection of microfiche: MIT's theses, reports, and journal articles. Users walk into the library and if an item is not on the shelf a copy is in the microfiche collection. They then ask at the microfiche desk for that item--we copy the microfiche and give it to the user in about 10 seconds, and at no charge. We feel it is cheaper to do that than it is to circulate the item. The user can then reconstitute it in full-page size at his own expense if he wishes to do so. We are watching that expense of copying by the user, as we move it up and down, to see what the user tolerance is for microfiche as it is, as against hardcopy.. Right now we are running at 10 cents a page for copying, which is twice what it costs the user to copy journal articles per page on our Smith-Corona machines in the library. So we will move that cost and watch user reaction; but, that is the focus of our work: to find out what the user tolerance is for the various kinds of display. Coming back for a moment to the display of images, our March 1970 display was on a 1000-line screen and you can get an idea of the clarity of that image. We do offer the user the opportunity of looking at a full-page from a journal or report, or of looking at any one-ninth of a page, blown up to full-page size, so that there is an opportunity to see subscripts, superscripts, equations, and footnotes.

Number of Users Not Limited

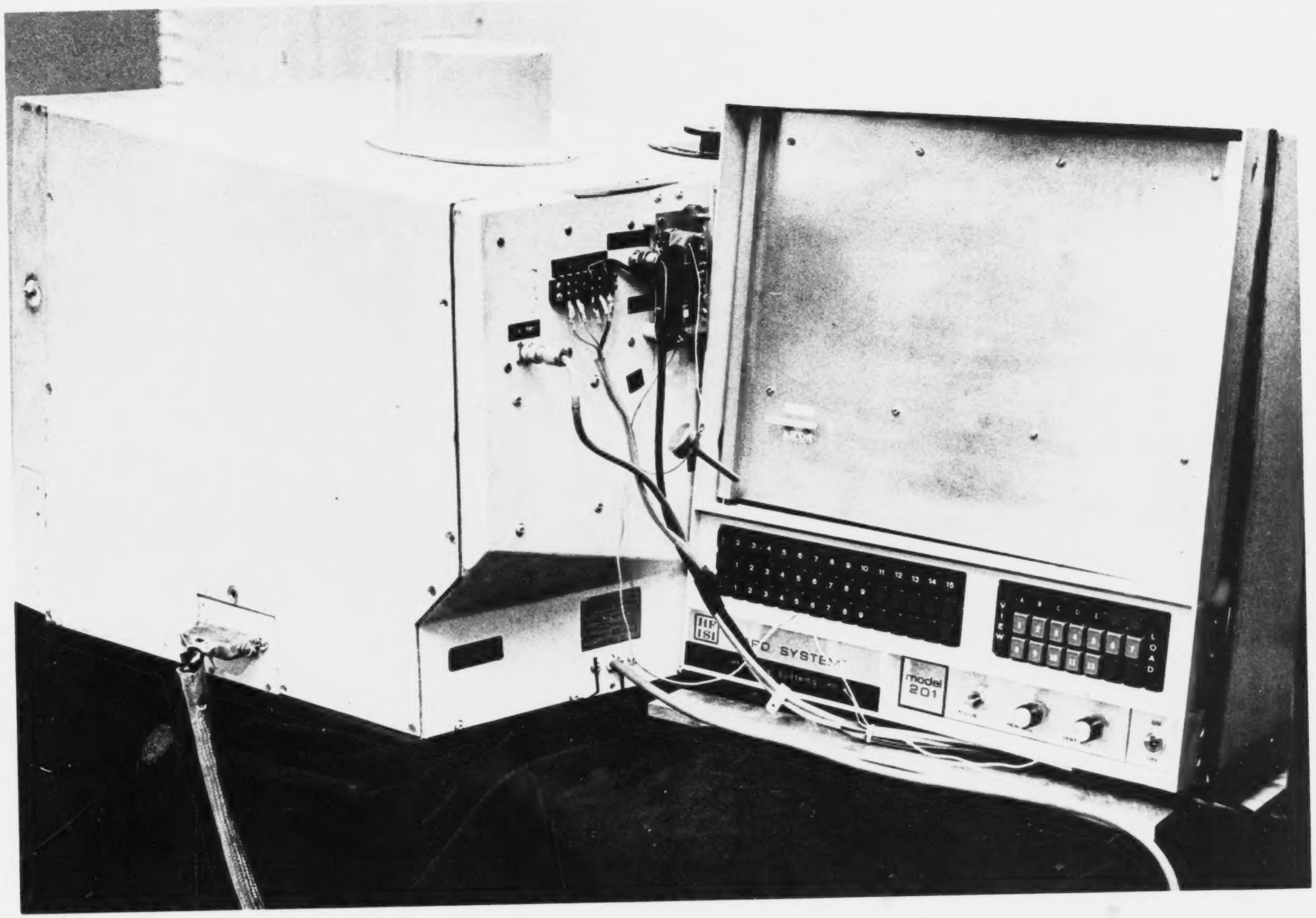
Dissemination Fiche

Displays Normal or Enlarged

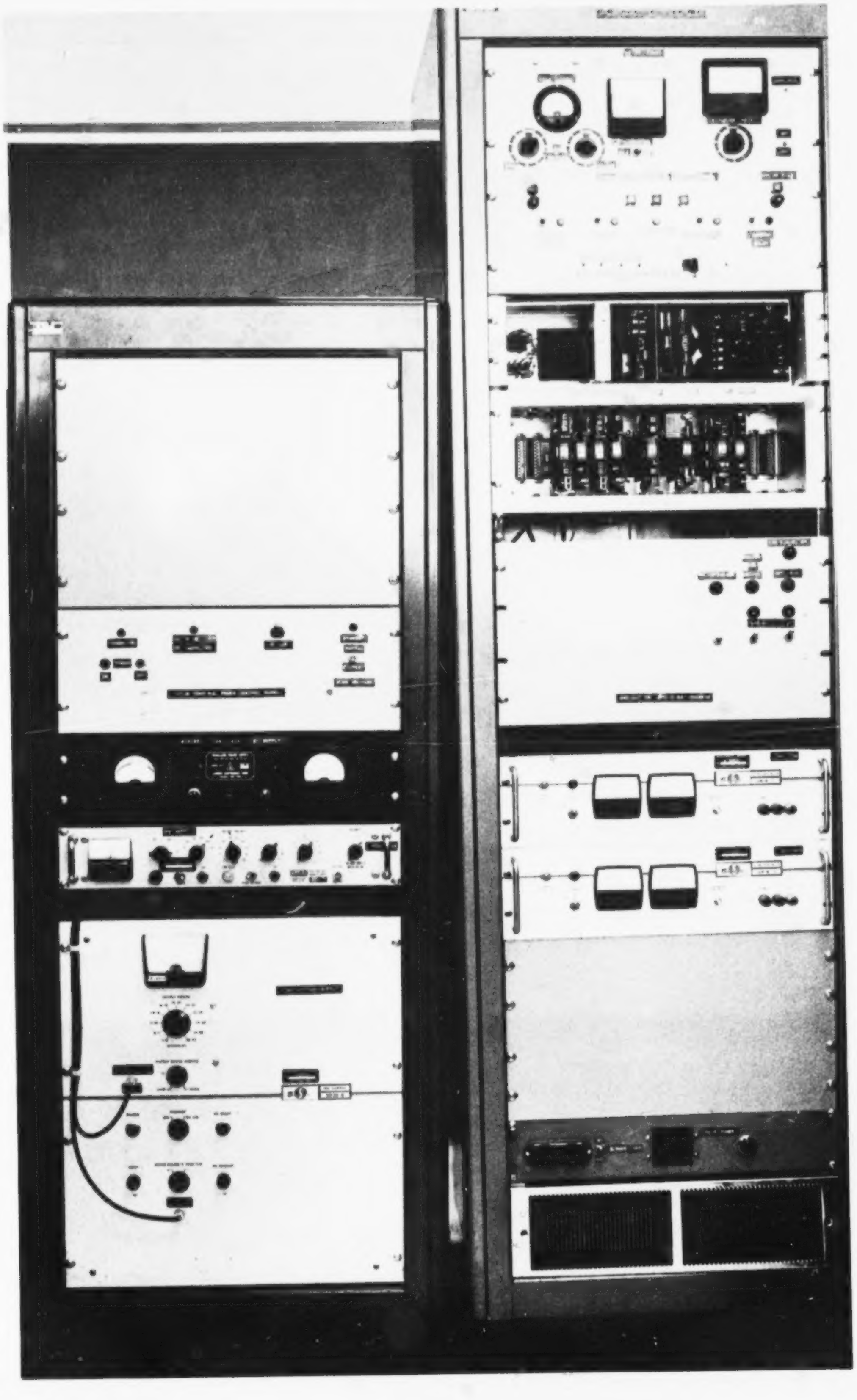
Stevens

Illustrations

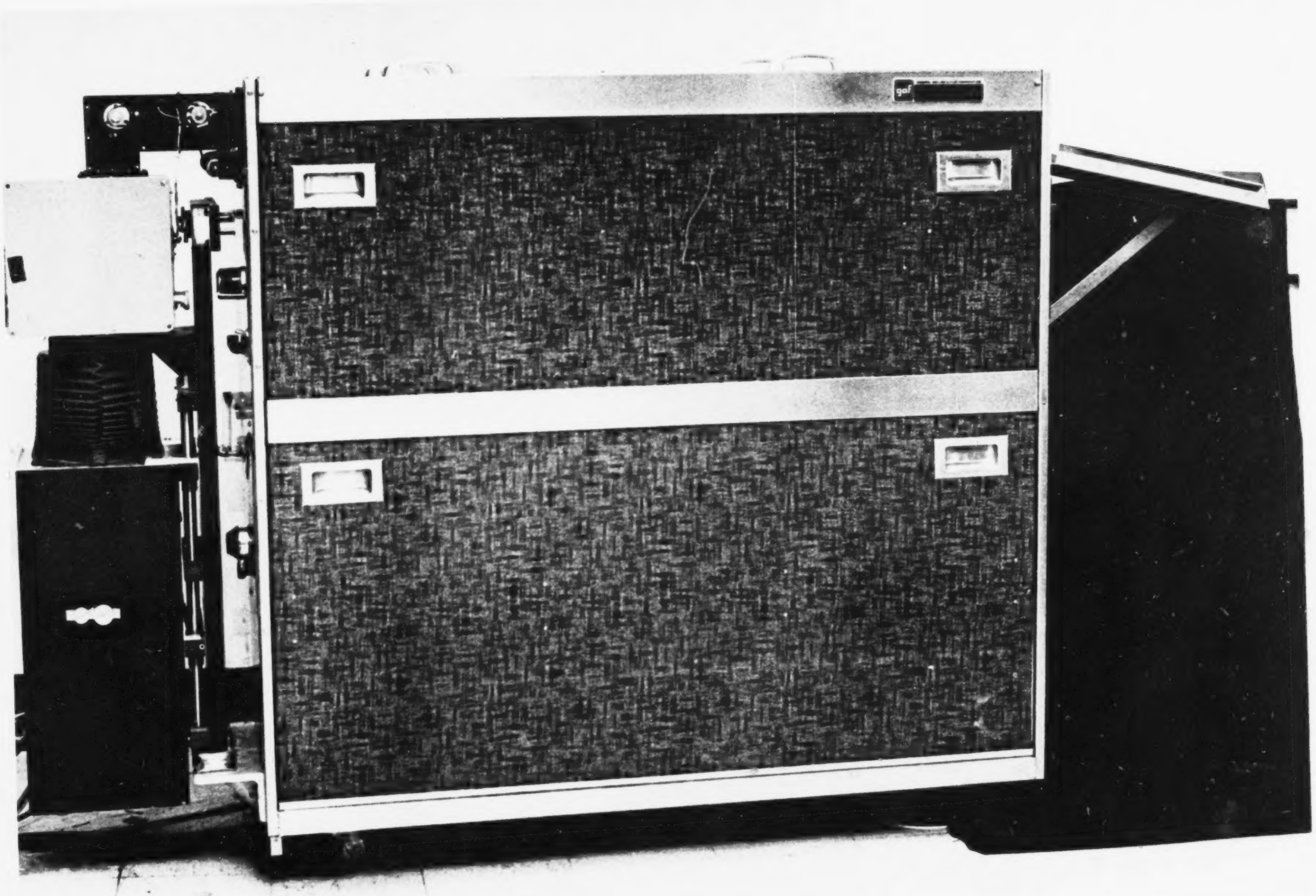
I have tried to tell you very briefly about the beginning of Project Intrex, our focus on user experiments, what we have done in text access both for remote text access and local text access, and now I would like to close by running through with you very briefly the slides that show you what I have told you.



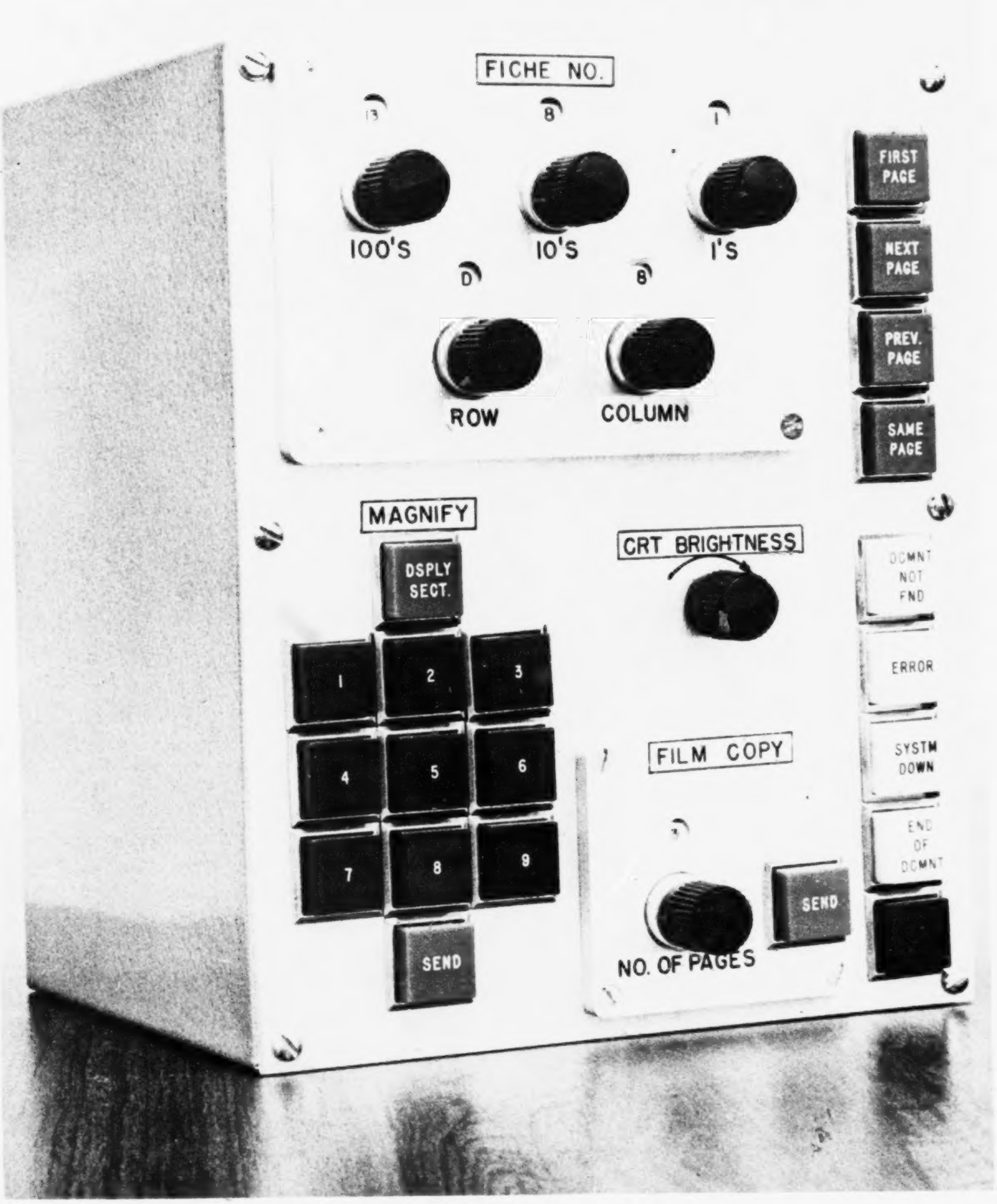
Stevens - Figure 1. The Houston-Fearless CARD units, 90 degrees to one another, with the scanner in between and out-of-sight.



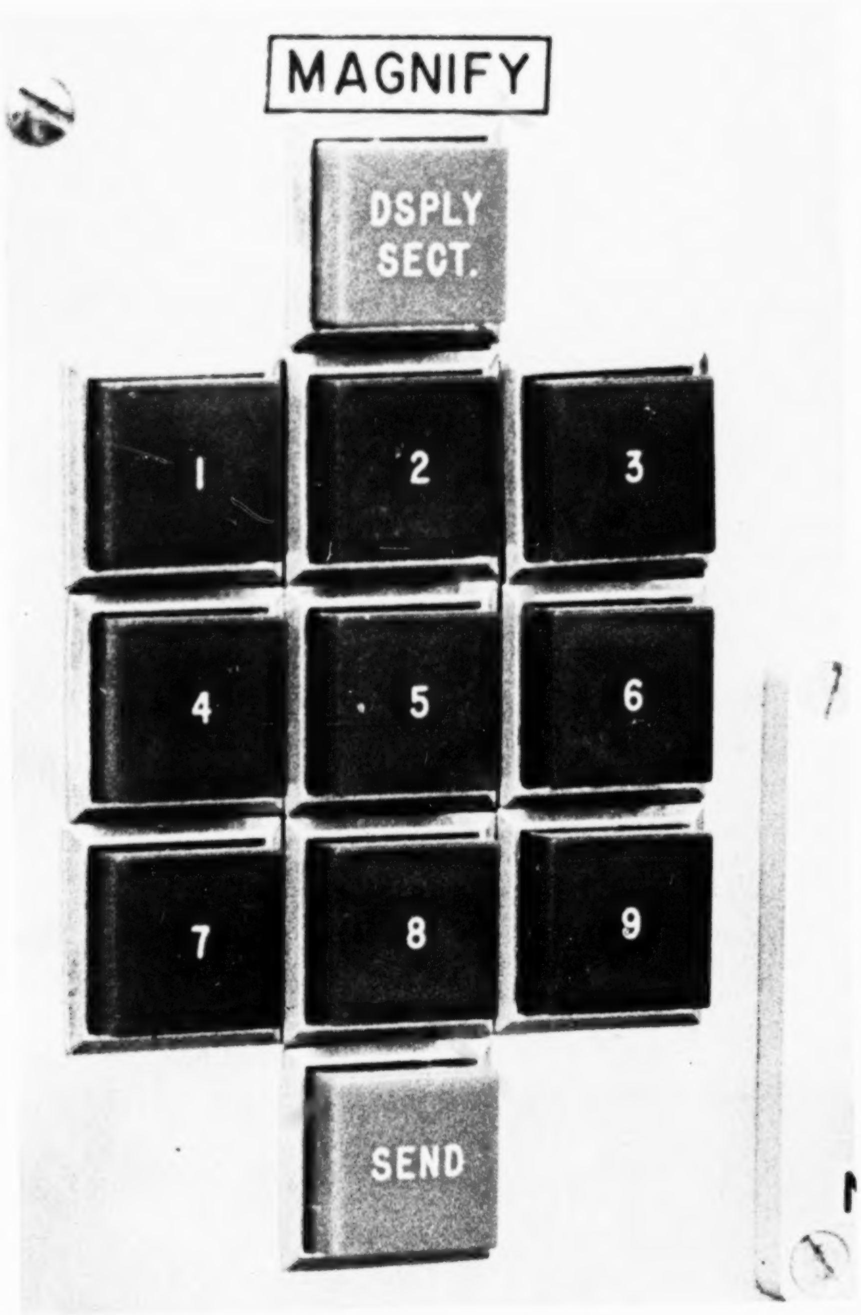
Stevens - Figure 2. The logic that controls output from microfiche to microfilm.



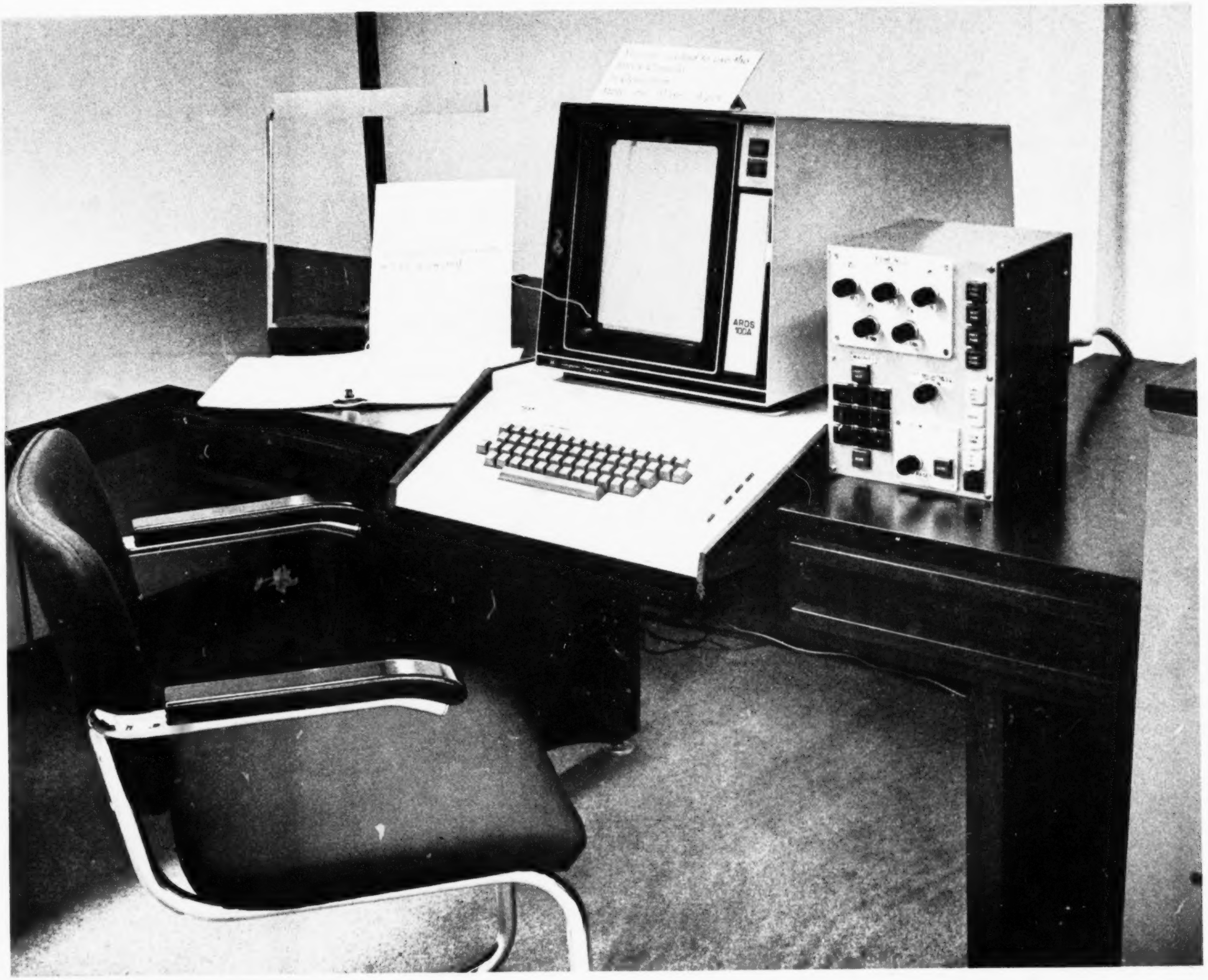
Stevens - Figure 3. The film terminal that the user activates to produce a film copy for personal retention.



Stevens - Figure 4. The text access control can be manually operated to call for the fiche by number and can, on command, call for the first page, the next page, the previous page, or the same page; or magnify a section of a page to full page size.



Stevens - Figure 5. For display of a page the user indicates the section wanted and activates the display by pushing the "Send" button.



Stevens - Figure 6. Here is the console for the augmented catalog hooked up with the text access console next to it. These two have now been merged into a single unit called the combined terminal.

WILLIAM D. WHEELER

Mr. Wheeler is a native of the Niagara District of Ontario. After graduation from the Ontario College of Art in Toronto, he was employed for some seven years as an Architectural Representative for an industrial glass company. Following that experience, he managed Microfilm Service Standards in Toronto and Montreal; then after two years with Xerox Corporation he joined the Public Archives of Canada in 1963. Mr. Wheeler is presently the Chief of Technical Division at the Archives; he is a co-founder of the Canadian Micrographic Society and a member of several international organizations which are concerned with reprography. He is particularly interested in the development of national information systems and the part that microforms are expected to play in such systems and in educational institutions.

MICROFORM STANDARDS

Operational Differences: Canada and U.S.

In order to help you better understand the environment that surrounds the centre of microfilming in Canada, it is necessary that you know some of the ways in which we, in Ottawa, differ from our opposites in Washington, concerning libraries, archives, records management and, in particular, microfilming standards and specifications.

You are all familiar, I'm sure, with the roles of your Library of Congress, your National Archives, and the General Services Administration. In the United States, the Library of Congress serves as both a Congressional Library and a National Library, whereas Canada has two separate and distinct libraries to perform these functions: the Library of Parliament and the National Library. Our Public Archives is unusual, if not unique among national archives, in that it is not limited to government records and can provide services which in other countries require several institutions, most of them supported by government funds. For example, the papers of Canadian Prime Ministers are added to the holdings of the Public Archives, requiring no distinct addition to building or staff, while in the United States a separate presidential library is

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established for the papers of each president. The Public Archives serves as a national portrait gallery, has a national map collection, an historical library, a national architectural archives, and is now developing a national film archives.

The advantages of the Canadian system of centralized control and coordination of records management and archival functions are generally recognized, and it is considered a useful model for developing countries.

Centralized Microfilm Management

As part of our records management function we have had responsibility for a Central Microfilm Unit for 15 years, which, operating on a cost-recovery basis, provides efficient and economical microfilm services for many government departments that cannot carry such full service themselves. Our Micrographic Advisory Section directs or monitors government microfilm systems' studies, examines all equipment requisitions, advises on all matters concerning micrography, and conducts two annual micro-technology courses. We are also commencing an evaluation service for microfilm equipment.

Definitions

When we use the words "standards" and "specifications" we refer, in the first instance, to a recurring specification which has been agreed upon by both parties, the procurer and the supplier. A "specification" defines the physical requirements, provides a detailed description of an item or service required, and may indicate the performance expected. Unfortunately, we are prone to use either word too casually without sufficient concern for the proper meaning. Your Department of Defense leads the way in many areas of specifications. Your National Bureau of Standards has long been of inestimable value to the world in determining and issuing standards. We, like many others, use those standards without question when preparing our own specifications. An important difference for you to know is that our Department of National Defense does not play the same role in microfilming specifications as your Department of Defense, particularly in the engineering drawing field.

We have in the government a "Department of Supply and Services" (D. S. S.) which, as its name implies, is concerned with procurement and common services. The common services half includes such activities as consulting services, computer services, social insurance, printing, central pay services for all government employees, and specifications.

Responsibility for Specifications

Responsibility for specifications of all types is held by a branch of D. S. S., the Canadian Government Specification Board (C. G. S. B.). It can delegate responsibility for special technical subjects to departments considered most knowledgeable in those fields.

Since our Public Archives has jurisdiction over Records Management and over microfilming (which we recognize as a special form of records management) the Public Archives heads up the C. G. S. B. Committee on Microfilming. From that point on the Public Archives calls the shot, as it were. And it certainly hasn't hit the bull's eye too often as yet! It could be said that we have passed through two phases in our efforts to produce microfilming specifications, and are now in our third. Let's look at the first:

Producing a Microfilm Specification

Our experience in specifications writing commenced in the late 50's and the efforts of that committee to produce a specification for microfilming of engineering drawings culminated in 1962 with the issuing of a specification that was almost a duplicate of your Mil. D. 9868. An important difference from the U. S. specification was the inclusion of recommended drafting procedures as an appendix. This specification was revised in 1964 and we have not, I regret to state, issued a specification since.

That's a pretty poor record, but an examination of our development in the past two years will, I believe, be helpful to some of you who may find yourselves in similar situations. Perhaps you can recognize similarities that you have already experienced.

The Actual Situation

Our original committee that was functioning about 1960 consisted of members drawn from departments which were using microfilm in various ways, but using it mainly for records security and space saving. Consequently, those members were not systems oriented. They were, for the most part, administrators. The technical group among them mostly came from our Department of National Defense. The real work was done by two or three Army and Air Force officers who were in close touch with your own D.O.D.

Drafting Committee Membership

Phase two commenced in 1966 when it was apparent that the Committee should again take a look at the specification. The Committee, still in existence on paper, had changed. "The Old Guard", as I refer to those members, were either in more responsible positions, in other areas not related to microfilming, or had retired. A few remained and were still available. However, it was difficult to cast the old aside and in rebuilding the Committee the heart prevailed over reason too often. The new committee had some of the old, a number of new who were chosen because of their close contact with microfilm applications, and, (very important) representatives from manufacturers of microfilm equipment and supplies. This was the first time that persons from outside the government had been invited to sit on a Microfilm Committee. My Director continued to act as chairman, a job which his position traditionally carries.

The actual work of producing specifications was assigned to three new subcommittees, namely:

1. Engineering Drawing Subcommittee
2. Library Subcommittee
3. Data Processing Subcommittee

Duties

The job of the Engineering Drawing Committee was to update the 1962 specification.

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It was intended that the Library Subcommittee be responsible for roll microfilm, cassettes, and microfiche, and that the Data Processing Subcommittee consider special films for computer output microfilm.

The suppliers' representatives sat on the main committee and also the subcommittees which were comprised of selected members of the main group. Two persons acted as liaison, the secretary who is from the C.G.S.B., and myself.

No Accomplishment to Date

The organization seemed good. Each committee held several meetings over the next year, and the net result was zero!

Here are the reasons:

a. The subcommittee chairmen were too busy.

b. The work was assigned to only the few most knowledgeable, who also were too busy. Due to my own ideal situation, with our Central Microfilm Unit to back me up, I drew the most assignments.

c. There were no "outside" contacts to provide us with information about real needs.

d. No firm goals were set for either time or coverage.

New Hope

So ended phase two in a state of rigor mortis, as it were. By the spring of this year, several things had changed that favoured the revision of the Committee and gave hope for success.

First: The Canadian Micrographic Society was firmly entrenched and nationally recognized as the spokesman for micrography in Canada. It was, and is, eager to assist.

Second: Development of the Technical Area of the Archives had progressed to the point where it is now the indisputable centre of microfilming in the government and the country.

Revamped Committee with Qualified Members

The revamped Committee on Specifications, as it stands today, has as its members qualified persons who reflect the automated era in which we are now involved. Our members are chosen to represent all government functions concerned with microfilming. The Treasury Board, which is the administrative arm of our Cabinet, supplies a management planning officer. He is knowledgeable of all systems that are being planned for all the government. Our Public Archives has two representatives, one from our Records Management Branch, and myself from our Microfilm Division. I also provide information about international relations. Our Department of Supply and Services now has four representatives. One is from their Organization and Methods Branch, another from their Computer Services. Our Secretary still comes from the Canadian Government Specifications Board, and we also have one member who is a project officer on standard paper sizes. Our Department of National Defense has been narrowed down to one representative, and our Canadian Micrographic Society, which we recognize as representing industry and commerce, has their man in charge of specifications and standards on our committee. We also have a representative from the Canadian Library Association.

Representation from Industry

These men set the policy and check the progress of the subcommittees. On each of the subcommittees is a representative from industry appointed by the Canadian Micrographic Society, a representative of the Public Archives Microfilm Division and other persons chosen for their abilities. Only the chairmen of the subcommittees are members of the Main Committee.

The benefits of such an arrangement are obvious, I'm sure, so I shall not elaborate on the great improvement in organization. Nor shall I speak of the work that is coming from the subcommittees. For the remaining few minutes I will concern myself instead with conclusions and hard-earned lessons that can be drawn from our past efforts.

A Tedious Task

It is obvious that in the work of drawing up standards, which in itself is tedious, uninspiring, and exacting in its technical demands, experience is a prerequisite and the members of the committee must have the necessary time and interest. Some of you may be thinking: "So what's so different about that from the purpose of any other committee?" The difference is this: The field of micrographics is growing and changing so rapidly that we have to be very selective in the persons we choose to be responsible for developing micrographic specifications. There is no room for the man with the reputation of a bureaucrat or who is content to soliloquize.

Passivity Undesirable

Our micrographic committees must not be passive enumerators who recapitulate information, most of which is already known. They have a responsibility to explore and identify, to encourage and promote, to consolidate and stimulate. It is a tall order.

The use of microforms in so many different environments compounds the problems. There's a great deal of difference between a row of readers being scanned by researchers in a library microfilm reading room, and the same model of reader being used by several persons in a contemporary business office designed by an interior designer who applies the latest ideas of what is now referred to as "office landscaping". We must identify the influences of user environments on our equipment before we issue our standards and specifications.

Dynamic Era

A few short years ago we thought we would be home-free if we could get all our architectural and engineering draftsmen to prepare drawings to our specifications. To achieve that goal alone is almost an insurmountable task, but now we are faced with drawings prepared by computers as well as the job of putting microfilm images back into computer tapes. We have alphabets and numerics, computer programming terminology, buffers and line printers: a member of our Data Processing Committee must be very broad-minded!

Timeliness

One of our main concerns is that we produce specifications in sufficient time to be useful and effective. Unfortunately, we have no guarantee that we can accomplish this end. The weakest link in the chain is the human being and it is on that weak link that we are at present concentrating. More consideration is being given to selection of committee members than ever before. They are hard to come by, for experienced men in microtechnology on the level that we desire are few and far between. We are just commencing to produce drafts of job descriptions for what we refer to as micrographers. Just as there are accountants, librarians, photographers, administrators, so we should and must have micrographers. Actually I have my sights set on "reprographers", but that's another story. Right now I'll settle for micrographers.

Micrographers Needed

To have in our reproduction systems micrographers who have chosen this field for their vocations (preferably graduates of a recognized diploma course) would make our standards committees better able to obtain the technical information they require for their deliberations.

There would be more assurance that the standards would be implemented faster and more effectively, resulting in better promotion and interpretation to the users. We would build up a source of knowledgeable persons from which we could obtain our members for our working committees. The micrographers in turn could, as a group, offer advice to our committees with regard to revisions and additions that would improve our standards. We are building the foundation for this new job classification in our government today.

One of the inherent problems that frustrates many of us who are closely involved in micrography the major part of our time is the loyalty to one's country instilled in our committee members. That statement has overtones of treason, I suppose, but let me explain. I hope we shall always stand

International Exchange

firm in having our own Canadian specifications. Sounds contradictory? Well, let me put it this way, we cannot afford to be self-centered. There's a lot of room for more effective exchange of information between countries in this field. As we have certain differences in our customs and business practices we need to have our own microfilming specifications, albeit they will probably be built around the products and processes of which the great majority originate in foreign countries.

What does annoy me is the lack of progress in reaching international agreement on the most efficient and economical paths to follow in determining satisfactory standards. We can and must agree to assign and share responsibility for user research, equipment evaluation, quality control standards, etc., etc., to either countries or groups of countries who can properly demonstrate that they are competent in carrying out such programs responsibly.

We are lacking neither manpower nor enthusiasm at international levels--just organization and good management. As a result of my excursions to a number of other countries I am personally aware of many persons who hold the same opinions in this regard as myself. I believe, too, that they are spending just as much time and effort as myself in convincing their superiors who have not been fortunate in being involved in international relations that many of our problems in developing specifications and standards could be eliminated if we made more effort to coordinate a mutual international effort.

Many Facets to Microfilm Use

In summary, then, I believe there should be more recognition of the many facets of microfilm in the category of micrographics. This would result in better qualified persons being available for continuing standards and specifications committees who are sufficiently knowledgeable about microtechnology.

Anybody concerned with standards and specifications should have a close and properly-identified relationship with

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microform users, microfilm suppliers, microfilm equipment designers and related organizations.

With regard to international communication, national pride must give way to common sense, or we shall continue to compound our problems.

Under far different and more grave circumstances Sir Winston Churchill once said to the United States of America: "Give us the tools and we will finish the job". I would like to apply the elements of that famous statement to our own standards situation. We have the tools at our disposal, and we have few excuses for not getting on with the job.

ALLEN VEANER

Mr. Veaner is a native of Harrisburg, Pennsylvania, was educated at Gettysburg College, Hebrew Union College in Cincinnati, and at Harvard University. He received his Master of Library Science degree from Simons College in 1960. Through the period of 1959 through 1964 he managed the Microreproduction Service at Harvard. A member of NMA, The Society of Photographic Scientists and Engineers, the American Society for Information Science, he attended the first two International Conferences on Reprography and visited major reprographic installations in this country and abroad. He is a member of the Advisory Panel to the Association of Research Libraries' Microform Technology Project (Task 1, on Bibliographic Control). He has published some two dozen articles and papers on reprography and micropublishing. His book "The Evaluation of Micropublications" is currently in press and is to be issued by the American Library Association in 1971. He is now the Assistant Director for Bibliographic Operations at Stanford University Library.

BIBLIOGRAPHIC CONTROLS

Outline

I would like to make three major points this morning: first, to distinguish two aspects of micropublication; second, to offer a simple layman's definition of bibliographic control; and third, to summarize briefly the results of one area of the Association of Research Libraries (ARL) Microform Technology Project for which Felix Reichmann (of Cornell) is the Principal Investigator--that is the one concerning bibliographic control

Expanding Industry

Inside the front cover of THE GUIDE TO MICROFORMS IN PRINT is a list of micropublishers. That list is some 50 or 60 names long. When the ARL Microform Technology Project got underway, one thing it attempted to do was identify all existing micropublishers. The number identified exceeded 600 which is indicative of a very rapidly growing field, or a very rapidly growing technique, and that we cannot find everything that exists on microform in THE GUIDE.

Photography

Marketing

As to the two aspects of micropublication which I wish to distinguish, the first (1) is the TECHNICAL aspect. The technical aspect is concerned with photography; with camera work and quality control. Representatives here from the microform industry itself are very well aware that this is a whole problem area in itself, that whole books can be written on the subject. (We have with us the distinguished author of one of those books, Dr. Carl E. Nelson, whose book, Microfilm Technology, is already a classical text. A second aspect of micropublications concerns: (2) DISSEMINATION, and that is to say, once one has gotten over the technical hurdles and knows how to produce microform, then the second aspect is dissemination and marketing of these materials; and there are representatives of dissemination interests here in this room.

Access

I said that I would distinguish two aspects, but I really want to go on and talk about a third which is (3) BIBLIOGRAPHIC CONTROL, a neglected aspect. The term "bibliographical control" is librarian's jargon, so for the benefit of the non-librarians in the audience, I think the easiest way to define it is to say it answers the question from the library user: "Do you have a certain book in your library?" or alternatively, "What books does your library have on certain subjects or historical periods?" (The concept is really quite simple, but when one gets into multi-million-item files, things begin to get a little bit complex.) So, the final purpose of bibliographical control is to provide USER ACCESS to these materials which have been provided to us by the dissemination techniques available, which, in turn, have been made possible by microtechnology. But, all the achievements of microtechnology and all the achievements of marketing and dissemination are really quite useless unless you can TELL THE USER IN THE LIBRARY WHAT YOU'VE GOT.

I have been in the situation innumerable times where faculty members and students will come in fulminating about the library's lack of some terribly vital and important resources because they are not in the card catalog, and after the man has cooled down a little bit, a good reference librarian will

Librarian as Access Instrument

be able to inform him that there is a high chance that the library does have that material. Perhaps it is in one of the major micropublication projects that has been issued and to which the library subscribes. But, if you are *really* out of luck, what will happen is that he will send for something on inter-library loan, or he will get a xerox copy and put you through the expense of procurement and cataloging in order to get something that is *already in your collection*, sitting there in some collection of fiche or some section of roll film. But, it cannot be assessed because inadequate bibliographical control has been provided for that micropublication.

Scope of Card Catalog

Very often, any discussion of bibliographic control of microforms will boil down to the question: What is it that you are going to put into your card catalog? What will be the scope of your card catalog? Are you going to put an entry into it for every single technical report in the ERIC system, every AEC document, every NASA report, every item in *Early American Imprints*, everything in *British Sessional Papers*, and what have you? I really would like to defer that question to the discussion period or perhaps to the afternoon because, in a certain sense, it is not relevant to what I want to say this morning. I say it is not relevant because a major conclusion of the ARL Microfilm Technology Project was that "*some form* of bibliographical control must be provided for every single item in the library." Now, *HOW* you provide this control, whether by check lists or published book indexes, or by separate cards, while not immaterial, is not relevant for the purposes of this discussion. The important point is the establishment of the PRINCIPLE that we must have SOME KIND OF BIBLIOGRAPHICAL CONTROL!

Principle of Bibliographic Control

Now to move on to some of the conclusions of the project which covered a two-year period and was conducted in two phases, and is still in progress. Those of you who have seen the report know that there was an environmental study phase conducted by Don Holmes, and a bibliographical control phase conducted by Dr. Felix Reichmann. Reichmann

The ARL Survey

conducted extensive surveys of libraries, writing a great many individual, personalized letters to reference librarians, catalogers, directors of libraries, all over the country. In fact, over 1500 letters were written to people, and in many cases there were second and third follow-up letters. (I know, because I got a letter; I didn't answer the first so I got a second one and I didn't answer that, and then I got a third one which I finally answered. Somehow I felt that because I was on Dr. Reichmann's Advisory Committee I didn't have to answer the letter; but Felix Reichmann doesn't work that way.)

Microform Controls BAD

At any rate, Dr. Reichmann confirmed what we really all know--that a lot of lip service is paid to the importance of microforms, and to the NOTION of bibliographical controls for them, but that the real situation is very grim. Less than 5% of the people who reported back were satisfied with their own local efforts. As far as national efforts were concerned, many people hadn't even heard of the major national tool that we have for some kind of bibliographical control--"THE NATIONAL REGISTER OF MICROFORM MASTERS." Many people didn't even report holdings to the National Register. Many people had never even heard of it! There was a uniform dislike of working with microforms on the part of the people who are assigned to the job of cataloging them and of providing bibliographical control.

The role of the users is a separate problem which some of you are undoubtedly tackling here. Nobody really liked them and Dr. Reichmann often says that using a microform is like "kissing a girl through a window." I think that is the way our catalogers must feel about doing the cataloging job.

Internationally

Bad as the situation is nationally here in the United States, it is even worse internationally. The ARL Group concludes that at this point in the historical development of bibliographical control, it is inconceivable that we can think about having international bibliographical control. Almost every country investigated had a much worse situation than the United States. In some, microforms are not even being recognized as publications at all. This will all be summarized in the report which was published just a few days ago. (The complete text of the report is obtainable for $5 from the Association of Research Libraries, 1527 New Hampshire Avenue N. W., Washington, D.C. 20036.)

Organization of Register

Getting back to THE NATIONAL REGISTER for a moment, one great problem with the Register is its organization. Librarians did not find its organization hospitable to adequate use. The prime organization was by LC card number, rather than by author and title. The Library of Congress is planning to alter this format and issue the Register in an improved format.

Inaccessibility of Materials

Publishers' Responsibility

The main conclusion of the ARL study, as I told Mr. Kottenstette this morning, is that "BIBLIOGRAPHICAL CONTROL IS A GOOD THING AND WE BETTER HAVE A LOT MORE OF IT," even though it is going to cost money. I think that if we don't, pretty soon the people charged with the purchase of major microform projects are just going to start thinking twice about whether they should pour a lot of good money (which you know is very hard to get these days) into very expensive projects which are in danger of remaining buried away, inaccessible to the prime clientele of the institution. Something has to be done, whether it turns out to be book-form catalogs, computer printouts, individual catalog cards, or whatever. The publishers must take responsibility for providing the bibliographical tools for the end use of his product, just as the publishers in conventional print take responsibility for putting title pages in books. That may sound strange to you in 1970, but when books were first printed not many of them had title pages. Back in the 15th Century, the text just started straight out when printing was first done, and I hate to think of micro-publications being in the 15th Century. But, if we don't have the means of identifying and accessing the material, it just isn't doing anybody any good.

Quality of Controls Provided

Several of the major contenders now in micropublication are making an effort to provide bibliographical control but there is a great span of quality difference within the effort. Some publishers are providing mimeographed check lists whose entries and whose cataloging data are not consistent with Library of Congress bibliographic standards, some of them are not even accurate, some are not complete, and when one is talking about large libraries with millions of entries in the files, then one very quickly discovers the authority file problem, and the difficulty of integrating into one's own file records that are not standardized or that are not up-to-date. Several firms furnish Library of Congress cards, but I know of at least one firm that is doing this but not up-dating the cards; that is to say, the cards issued are unrevised cards, in effect. If the Library of Congress has updated that card, or made any change, those changes are not reflected in such cards. Another firm, perhaps more conscious of the problem, has gone to a great deal of expense and effort to make sure that the cards they issue are updated and are consistent with the most modern bibliographical practices and I think that this is excellent.

National Microform Agency Recommended

Perhaps it would be useful if I summarized the major findings of the ARL Project. I think the most important conclusion of the ARL Microform Technology Project is that A NATIONAL MICROFORM AGENCY should be formed, an organization charged with promoting good technical and bibliographical practices in micropublication. Such an organization might be established among many places; it might be in the Association of Research Libraries itself, it might be in the National Microfilm Association, it could be in the Library of Congress; we don't know where such an agency should be at this time, but we know how badly it is needed to promote standards and good practices. It would have educational responsibilities for the complete spectrum of users and producers, and bring together these people in a common way very much like the American National Standards Institute (on a voluntary basis) tried to promote the interests of producers and consumers by adherence to good standards.

Agency to Certify Products

The National Agency would also have a certifying capability and would be empowered to place a SEAL OF APPROVAL on the products of those micropublishers which meet acceptable standards. This is a pretty big job and this is not a one-man sort of operation, obviously; this would require a great deal of funding and a lot of devotion and motivation, too, from everybody concerned. This is the most important recommendation.

ARL Recommendations

Let me run through five or six of the detailed recommendations: (1) No microform project should be produced without adequate catalog cards. The entries should conform in every respect to the Anglo-American Cataloging Rules so that they can be filed without any difficulty. (2) The Library of Congress should give to the processing of microforms a high priority but avoid duplication of the fully acceptable work of a commercial publisher. (3) The Library of Congress should further consider the inclusion of microform analytics in the MARC project. (4) Papers published in the professional journals should urge library administrators to give adequate manpower to the processing and servicing of microforms. (5) International uniform standards both for production and bibliographical control should be worked out and enforced to the fullest extent. (6) Our most important national tool or book, The National Register of Microform Masters must be better supported; we therefore recommend (a) a number of papers in professional journals and speeches at national and state professional meetings to explain the objectives, scope, and uses of the National Register; (b) broadening the definition of a microform master, explaining it clearly, and eliminating the technical questions from report forms; (c) reorganizing the printed register so that it conforms with internationally accepted standards of bibliographical organization, a goal that has already been accomplished. (7) The seventh recommendation is the establishing of some comprehensive guide to the bibliographies of microforms available for sale.

Guide to Microforms for Sale

This is one of our most serious needs because right now all we have is a lot of prospectuses and announcements and a great many different formats of catalogs in the micropublications; but there is no one publication that consolidates

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this material like "Books in Print" does. We have the "Guide to Microforms in Print" but, as I mentioned earlier, this covers only about one-tenth of the people that are actually in the micropublication business. (8) An International Directory of Microform Publishers should be compiled and kept up-to-date. (9) We should keep in touch internationally and try to promote international bibliographic control. Then, the tenth is the one I gave first because I thought it to be the most important, (10) to establish a national microform agency.

This concludes my presentation on the problem of bibliographic control.

LARRY BLOCK

Mr. Block is Manager of Micropublishing for the Microphoto Division of the Bell and Howell Company. Prior to joining Bell and Howell five years ago, he worked for several years as a social worker and parole officer, following his graduation from Kent State University where he studied psychology and sociology. With Bell and Howell he has served in several capacities both in their Sales and their Production Departments. About two years ago, he began his assignment relating to micropublishing. His current responsibilities include the development of new programs for the Microphoto Divisions's marketing force, as well as the reorganization of materials which are already available, in order to make them more useable by the academic community.

FICHE COLLECTIONS

What is Microfiche

It is my pleasure to be here with you to talk about microfiche collections. To begin, I do not know how many of you are completely familiar with microfiche; some of you are very knowledgeable, probably, and some of you not at all, so I will spend a little time talking about the concept of microfiche. For instance, you are probably very familiar with the roll film concept. The concept of microfiche is unlike roll film in that it is a unitized form, the idea being to put one segment of information on a form that can be used in a manner which makes individual items very easy to get to. When we are using a roll (which is something we have been doing for a long time), we have a continuous run of material or of information; while this has certain advantages, especially when searching such things as newspapers, there are disadvantages if you are interested in using a particular PART of any information system; then it is nice to be able to get to that part easily. One of the ways to get to specific items easily is through the use of microfiche. The idea of putting one book on one card makes it very easy for a librarian to get to that book. The bibliographic control section, which is available at the top of most microfiche, makes it very easy to file originally, then to locate and to disseminate to the user. Of course, there are some problems with microfiche. For one thing, they are easy to

One Book-- One Card

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steal. They are quite fascinating to a lot of people that haven't seen them before and they do like to take them out and show them to their friends; and I've just heard that they make an excellent bookmark. These problems probably will subside once people become accustomed to seeing microfiche and using them. You know there are various standards for equipment and materials and we have talked a lot about standards here. There are various standards now used in the microfiche field; in fact, they are growing instead of decreasing. I have a little poster here that we had made up to show you some of the microfiche standards (Figure 1). To mention a few: there is the NMA standard, the COSATI standard which is also used for ERIC, the 84-page, the 98-page, the negative and positive modes, images of single and double page, low range up to 24 times reduction, mid-range 32 to 50 times reduction (this is where the COM fiche usually fall) and the high range of 50 to 150 times reduction, and on up. Of course, the latter is PCMI. I think you know there is a battle going on between the micropublishers to decide what size is going to reign supreme, or if there is ever going to be a standard size among the various companies. Who suffers in this multiplicity? The library, I'm afraid. There is the problem of equipment; you have to buy a different piece of equipment for each form, a reader and a reader-printer. The companies themselves, with a strong profit motive, are afraid to develop equipment and tie their futures to a particular size format at this time because of what might happen if another format takes over; then, their readers and reader-printers would be of little value to anybody, and of course they would not be able to sell them. But there is something that LIBRARIANS can do, and we were getting at it a little bit yesterday. They can apply pressure on commercial firms to come to agreement. There is the NMA, the ALA, the SLA, the ARL, and the Library of Congress, that can all work with our industry and help us to come to a firm decision on which direction to go and which format to use. While this battle goes on as to what kind of fiche to use, the micropublishers themselves are suffering in the area of WHAT TO PUT ON THE FICHE

Many Standards for Fiche

Agreement Necessary

because, there again, they are afraid of the same kind of thing; they are afraid of putting too much of their material on one size format and then ending up without a market for it.

Developing Collections

Form Keyed to Use

Getting on to the selection of collections for microfiche, what are the criteria for selecting a particular collection for microfiche? Probably, of most importance is the profit motive, of course. Will it sell? Who will buy it? How will it be used? This sort of thing is of major concern. Yesterday on the afternoon panel somebody said that almost any micropublisher will put almost anything on film or fiche and it will sell; well, that's not necessarily true. I know in our own company we have a venture analysis that we have to go through every time a particular project comes up, and when we decide to do a certain project we have to justify it financially; the way you justify it financially is by some sort of vague marketing research which eventually tells you that the product will or will not sell. If we are not able to justify, then that particular collection will not reach the market--that material will not be put on film. While we are considering, at this particular time, perhaps fifty micropublishing projects, I will be very happy to see ten of them reach the market. While you are considering what kind of collection to put on microfiche, you have to consider what kind of microform to use for it. Bell and Howell, for example, uses several different forms. We use many of these that are shown here (Figure 1), roll film is certainly something which we use a lot. So, when we talk about a particular collection we think of the USER first, because we want to know HOW he is going to use it, and WHO is going to use it, in order to decide what form we will employ. For example, if we were to put a run of newspapers on film it would be our obvious decision to use 35mm roll, because someone doing the kind of research that is done with newspapers probably is not interested in one particular issue on one particular day; he is probably going to research a particular subject over a period of time, so the continuous roll concept will work very well. On the other hand, if we were putting books on microfilm, it makes sense to put them on a UNITIZED form (and hopefully in a high reduction form where you can get an entire book on one card) so that the librarian will be able to disseminate the titles individually. Periodicals fall somewhere between the roll film and the microfiche concept and there will probably be some kind of a battle between the micropublishers in this area. We, for example (being very indecisive) have put out Newsweek on both fiche and roll film. This (Figure 2) is one complete issue, the first issue of 1970, of Newsweek on one card, so if the student wanted to do research on one particular issue of Newsweek, the librarian could hand him that card very easily. On the other hand, sales in the microfilm industry have shown that many, many more schools are subscribing to Newsweek, Time, Life, and all the other big and little periodicals, on roll film; so it will be interesting to see where that sort of periodical will go. But basically, the choice is not between different formats of microfiche; I believe it is really a choice between whether to use the fiche concept or the roll concept. I think that whatever the material may be that you are putting on microfiche, eventually this can be put on one format, and I hope that eventually the one format concept will develop. Now, before I get away from that, I would like to say that PCMI (for example) is a microfiche with a roll form concept, to my way of thinking; and this may have some value in itself and may eventually get us away entirely from the use of roll film. We are taking into consideration, at this point, the profit motive in some of the forms that we use to produce microfilm collections and microfiche collections.

What
Form
Periodicals

Roll Form
on
Fiche

We might get into a definition of what a collection is in the traditional micropublishing sense. Actually, it has a relatively short history; only 15 to 20 years have been devoted to micropublishing collections. I think that in most companies, micropublishing grew out of the service concept; our own company was organized around service to newspapers. We filmed papers at their expense, in a manner which they chose, and then found that there was an additional market,almost a bi-product market (the college, public library, and now eventually even the high school library)

Development
of
Micropublishing

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for roll films of newspapers. Consequently, there are some problems, because the filming that was done by us, by Library of Congress, by our competitors, even the WPA during The Depression, was done in a service context in a preservation sort of situation, rather than to develop an easy research tool. So, all the problems we are having today with how to use film, are the result of the fact that these papers were not filmed with the library user in mind.

Collections of Single Titles

Probably the simplest kind of collection, if we can call it that, might be a long or short run of a particular title; for example, the Los Angeles Times from the 1800's to the present. Another, a little more complicated type of collection, also growing out of the same situation, would be a group of serialized titles. Instead of getting full runs of any particular paper, a library might be interested in concentrating on the Civil War, for example, and get ten papers from the period 1860 to 1865. Again, this is obviously a contrived or arbitrary kind of collection, put together from existing materials, which had in the first place been produced as a service to newspapers. Next, is a group of monographs and serials covering one broad or specific subject. An example is a Black History Collection. The various ERIC clearinghouse collections are another example. Here, material is gathered together on a particular subject. In this manner, I think, we are first seeing micropublishing as it probably should be. This is where USER ORIENTATION is the first consideration and the collection itself is organized around the needs of the user. It will probably concentrate mostly on materials that are new, and I don't necessarily use the term NEW in the sense that Mr. Otten did yesterday; I mean NEW in that you are filming PARTICULAR MATERIALS with a market in mind (the market of the library user), rather than taking materials that are already filmed and trying to reorganize them. The newest kind of collection involves putting together new materials which have not yet been published in any other form but the microform; I think this comes much closer to what Mr. Otten was talking about yesterday. This is not necessarily all computer generated, but the materials

Serialized Titles

Subject Area Concept

Microform's Original Publications

are organized and published new in microform. This might INCLUDE materials that have been published in other places, but which are now either abstracted or cut out by article. I think a good example of this is the material ARCATA Microforms has just come out with, which is known as a "News Bank." They are taking clippings from various newspapers and periodicals around the country, organizing them by particular subject (pollution for example) and offering them on microfiche. They are not available in that form through any other medium. As we see it, there is value in each of these different kinds of collections and I am sure that each kind is going to continue to be produced.

Original Films not Oriented to User

It is really impossible to go back and film something like the Los Angeles Times with a user orientation in mind. The files aren't available any longer; where they are, they are in such bad shape that pages and issues would be missing and the result would be something not as good as the present collections. We hear about the possibilities of taking film that already exists and reworking it in such a manner that particular pages and issues can be pulled out, and perhaps eventually we will be able to come up with something that is more user oriented from the film which already exists. Of course, the other kinds of collections are more useable and more interesting to libraries, so I think they will be going along in the near future.

Collections from Bibliographies

The way we develop micropublished collections hits very close to home with librarians. There are two very well-known approaches used among our own people: the shotgun approach, and the rifle approach, which are a couple of different ways of organizing collections. The "shotgun approach" is what I call a "multi-gathered use of bibliography approach." Instead of going to one basic collection, someone has a bibliography produced, and then goes everywhere trying to get this bibliography covered. Obviously, there are great merits to this kind of approach because you get the broadest possible coverage of a subject. Theoretically, this is better than any particular library's collection and holdings on any particular subject. But there are some faults, of course. For one thing, it is hard to get multiple arrangements with libraries in this day and age, and often you are not able to get all the books in the bibliography. In addition, no bibliography seems totally acceptable to anybody: "so-and-so's bibliography," "what does he know," and that sort of thing. There is always going to be somebody that feels you have less than the best bibliography. It limits individual choice in a way, also. It is usually quite costly

Costs

to assemble, in comparison to the other approach, and, of course, the cost has to be assumed by the eventual buyer, and that is the library. In the beginning, you have the cost of assembling the bibliography, which is expensive. The "rifle approach," on the other hand, involves using the

Use of Institutional Collections

holdings of a particular institution, or of several institutions, that are well known and have good, solid collections in a particular subject area. The merit of this kind of collection is that it is easy and quick to assemble; there is less passed-on acquisition cost, and usually there is excellent coverage in the schools chosen so that, basically, you are getting an excellent collection to start with. You are not going to be paying too much for it. My question would be: "Is the extra value that you would get by using a bibliography worth what you are paying for it?" There is credit financially to schools supplying whole collections, and prestige to the specific source from which you get the material. For example, Atlanta University has an excellent Black Collection. We are filming there now. We feel that offering this kind of collection to a school that is just starting a Black Studies Program is offering them as good a collection as that at a school that has had an ongoing Afro-American Studies Program, and probably would suffice in almost any instance. Again, the school will benefit. Atlanta University will receive royalties on the collection and also have the prestige of having their collection circulated. But, there are some faults here too. Usually, the royalty paid to such an

Royalties

institution is somewhat higher than would be paid to a massive group of institutions from which a few books were borrowed from each, and this is passed on to the buyer. Still, it may not be as expensive as paying for bibliography and the high cost of getting around to get the material. If you choose a good source, you cut down the degree of this expense and you are really developing a very nice prestige factor for the school. In addition, there is the relationship you are building up, and that is something that is not easy to measure; but building up these kinds of relationships with schools is good for both the library field and for our own micropublishing field. Bell and Howell is going to continue to do both kinds of collections; we always have and we probably will continue, depending on the type of material that is needed by the library. If something is not available at a couple of particularly good sources, then we will try to get it from many sources. Filming a back file, for example, often has taken as long as five years with the use of as many as 20 different schools to supply the material. For example, the Underground Press Collection is a very current kind of thing. It took, I believe, four different sources just to get the basic material, and that is something that is being published right now; it is not the kind of thing that is 150 years old that you must go to 20 different historical societies to find. The editing and organizing of materials to develop new materials for education is probably the most exciting for the microform publisher at this time. I think we all have a feeling of wanting to do something new and creative, and this is an area in which we can do it. Organizing materials that haven't been organized before, actually having editors come in and work for us to organize these materials, and publishing new kinds of useful things, this has great excitement for us. Among examples of programs that have come out of my own company is a package on The Kennedy Assassination, where we went to many different newspapers and got their coverage; another is The Apollo 11 Program. This has had a great deal of appeal on the high school level. I think the total extension of this concept is the kind of thing that Mr. Otten was talking about in particular yesterday, which is the publishing of totally new material, both computer generated and generated in the more conventional manner. This development should have great appeal for scholarly publications because, in many cases, a particular monograph is not going to have the saleability that will warrant the cost that goes into traditional printing of books. I think that you know from dealing with publishers

Extensive Undertakings but Creative

Scholarly Publications

that a minimum of 3000 to 10,000 books is necessary to make a project successful. In the case of microfiche, this can be more in the area of hundreds; the idea of remaindering a few microfiche would be no more important to a publisher than throwing them in the wastebasket; whereas remaindering books poses a serious problem in storage, sales, etc. Of course, we got turned around by thinking about a lot of different people and we must come up with a technology that will make it possible for all interested persons to have access to microform readers. When this happens, we feel that you will see more use of micropublications; perhaps scholarly journals will be published both on paper and with an accompanying microfiche at the time of publication as a starter; then the ones that don't have the extensive circulation that warrant paper printing will eventually come out on microform; and ultimately, perhaps a lot of journals will come out only in microform. It is certainly easier to store, and as people get more familiar with the use of reading equipment, and as the reading equipment becomes more useable, the resistance which a lot of people now have should begin to break down.

Short Runs

Reading with Machines

As to improving the useability of collections, we have been dancing around this subject for the last day. There is the questioning of titling. What kind of information should go into the title of a microfiche? You can see this is a fairly broad area on fiche, at the top, that would hold a fair amount of information and be eye-legible. On this point, the decision in most companies is made by someone like me, a businessman. We do need closer contact with libraries and a standard, perhaps, of what should go into the space available for a microfiche title. I think there have been some standards set up (and I am not overlooking the fact that COASTI has particular standards), but I think that for actual books on microfiche, the Library of Congress type of cataloging information should be specifically spelled out and placed in a particular area in a standard fashion. That will make them more useable. Another thing: indexing within the microfiche itself. One of the questions we must answer is "should frames be assigned numbers arbitrarily

Using Collections

in addition to the page numbers which may have been on an original publication." Frame numbers would be aids for someone using a scanning device or a pointing device to be able to dial, or point, or push a button to get directly to the frame that he wants. Again, COASTI has these kinds of standards, and other industrial-type applications definitely have these kinds of standards. The question of Library of Congress cards comes up again and again. Should they be included with a collection, should they be a part of the collection automatically? Should there be a separate charge for them so they can be purchased either separately or with the collection? Will they be used in the future in the same manner as at present, or will libraries eventually use computer indexing so that Library of Congress cards will not be needed? As I see it, the setting of standards by mutual agreement will be a good thing, and I think I can speak for micropublishers that it will be definitely welcome; I do feel that this kind of direction hasn't really come in a particularly strong way from the libraries themselves. We have heard complaints, we have read articles, but conferences are still going on among librarians regarding the use of microforms and what microforms should contain, and these meetings do not include micropublishers. That seems a one-sided kind of discussion that won't really yield particularly good results; libraries have a responsibility, I think in return for the satisfaction that they want to get from the micropublishing industry, to let us in on the total problem. For one thing, a lot of complaints have come from the library regarding the contents of microforms: this collection is incomplete; this collection should have this or that. One of the problems, of course, is that in some cases we can't get the materials we want to put on a microform; one of the reasons we can't get the materials is that libraries won't let us. In the last few years, I'd say about two and a half years, we've been bashed with the reprint business. The reprint business has grown almost overnight, and microreproducers have been classed with the reprinters. Libraries, justly so, decide they want to get something for the material which they are making available to reprinters so they put a book charge, $30 or more for example, for a

Future Systems are Factors

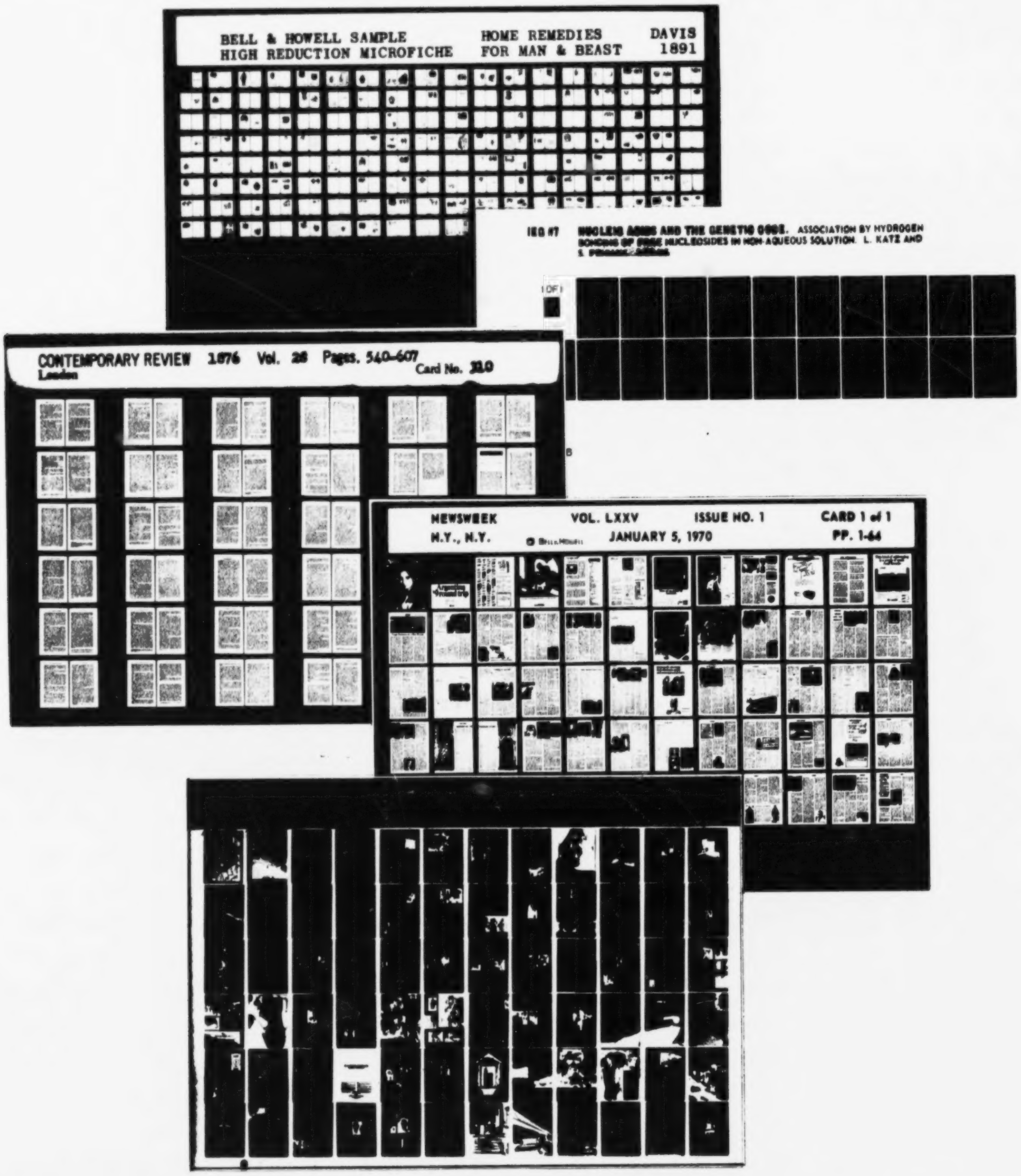
Reprinting

borrowed book. We have a little program that was called "Duo-page" which was going very nicely for a number of years. For this program, we would borrow a book for a particular scholar; we would clear the copyright, we would write to the owner of the copyright and we would give them a 10% royalty if he was willing to let us reproduce the book. We did this for 5¢ a page, soft-bound, and the average book we did was 300 pages long. At that price, we were getting back $15. Well, when you pay $30 for a book, you don't make too much money at $15. The average book in our catalog (out-of-print catalog) sells maybe two or three copies over a period of five to ten years because these are books that a particular scholar wants and they are not a part of any collection, necessarily. They are not what we could sell in any great quantity, so our Duo-page business has gone seriously down since we just can't afford to borrow books any longer. Instead, we have had to go to particular libraries that have been willing to let us use their books for a more reasonable (at least reasonable from our way of thinking) arrangement, either a copy of the film or a couple of dollars to borrow the book, and have been able to continue the program on this reduced level. Of course, it is much more limited because we cannot now borrow the range of books that we previously would have borrowed.

Materials Procurement

Communications Needed with Industry

In conclusion, it is my feeling that if libraries would be willing to communicate more with the industry, they would be able to get more of what they want, the kind of bibliographic control they would like to see, the kind of materials on microforms that they are asking for, and the organization of materials in a manner which they would prefer. The industry will respond to this kind of definition. On the other hand, we need cooperation from the libraries to get this material, to get it inexpensively, to indoctrinate the user, and to tell us how to develop it so the user will actually use it. There needs to be cooperation in a total way. From what I have seen, this conference is probably the first one (at least that I know about) that is looking toward accomplishing this kind of cooperation. Thank you.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Block - Figure 1. Samples of fiche used by Bell and Howell.

FRANKLIN D. CRAWFORD

President of Princeton Microfilm Corporation in Princeton, New Jersey. Prior to establishing his own micropublishing business, Mr. Crawford was a Senior Systems Analyst and Project Director for the J.C. Penney Corporation in New York City. He has held similar positions with Sak's Fifth Avenue in New York, Federated Department Stores and Allied Purchasing Corporation. In these positions he was involved in the planning and installation of large-scale manual and automated systems dealing with national manufacturers of data-processing equipment. He served as Staff Assistant to top management in these positions. He was Photo Officer for four years in the U.S. Air Force where he was responsible for management and administration of large photographic installations. A graduate of Alma White College, he has completed post-graduate work at New York University.

SPECIAL COLLECTIONS

I would like to say it is a pleasure to be here. We have just heard from a social worker that got into microfilming and I suppose you could say that I am a person from the retail or "the rag business" that got into microfilming. Now, if Warren Boes, Number Twenty-One, will hold down the "hogwash," I'll try to go ahead!

Review

Thus far we have had an overview from a pioneer in microform technology; a library systems review of information concepts with accompanying slides; a preview of a sophisticated information system possessing all the bells and whistles; a story of unrelenting struggle to achieve standards by our Maple-leaf neighbors to the North; a brief and unproductive swipe at the age old problems of copyright and standards; a wide-brush treatment of the microfilm industry's nuts and bolts that was both practical and blue-sky; the formula for a successful conference, a Johnny Carson cartoon; and a fantastic saga about a man who hunts bears without a gun! (This last item I hope to use again.) I often wonder what the Flintstones and Ally-Oop discussed when a couple guys from Egypt came along peddling papyrus to replace tablets of stone; I feel sure the issues were hotly debated as to advantages and disadvantages, perhaps much like the sessions we are involved in right here. At any rate, paper and paper refinements have been stock-in-trade items for hundred of years now. It is also an established fact that we are clearly in the midst of another fundamental communications change. Perhaps fate has decreed that massive changes will occur with our generation.

The Information Processs

The discovery of knowledge, the conservation of knowledge, the transmission of knowledge must be accomplished to perpetuate civilization. This, as a basic objective, leaves little to do but refine the communications hardware and sophisticate the software. The information process can be distinguished by two interests: (1) those who create and disseminate information and (2) those who seek information. Hopefully, in the next few years, greater cooperation will be achieved between these interests. An originator and disseminator of information would be, as an example, the American Chemical Society, providing their primary and secondary chemical journals in both the original hardcopy (the paper edition) and in 16mm or 35mm microform editions. Those seeking such information would be public, academic, and research libraries, along with private individual subscribers. It is evident that certain technical and mechanical functions which have historically been performed to accommodate printing, can be modified at no real inconvenience to comply also with micropublishing requirements. It would be quite natural for many large paper publishers to seriously commence micropublishing in conjunction with their present paper publishing. Computer microfilm output, a direct conversion of magnetic data-processing tapes to microfilm via cathode ray tube, will seriously affect publishing methods that now exist. It is apparent that to print paper, and subsequently generate microfilm editions of that same material by manually turning printed pages, cannot in the name of efficiency continue. Computers now possess the capability of composition refinements, upper-lower case, justification, various fonts and type sizes. They will add the further advantages of information message and

Modifying Printing

selectivity, utilizing an infinite number of permutations while shortening the time cycle required to deliver information to the seeker.

Why be a Microform Publisher

I would like to give you the reasons why I, personally, left 15 years of continuity to start a business in another direction. I always wanted to be my own boss. I used to say "If I owned this store I would do it this way." I kept hearing: "Go out and start your own store." So it is kind of like--put your money where your mouth is. I selected micropublishing because, after a fairly in-depth survey, I found that it was not very competitive at the time (that has changed). I found that it was relatively low in capital investment. Well, that was great because I didn't have much money. And, it offered a fairly high rate of return. Some of the characteristics that surround micropublishing will seriously affect printers, as I mentioned previously. Basically, if you are going to put something between two covers and reprint it, you have to say: well, I've got to print so-many before I can break even, and: I've got to peg the price on this particular volume at so-and-so. A decision like that requires considerably more expertise than in micropublishing. I sometimes have the question put to me: "What determines whether you will micropublish an item?" I say: "Well, we may make a lot of bad decisions but they cost so little we never know it." You don't have to decide to print 200 copies or 2000 copies. You can make the master and one copy; then with the second or third copy you may be out of the woods--maybe on the first, depending upon the item. You can PRINT ON DEMAND. Printers now have the problem of over-runs and storage. I can tell you for sure that the American Chemical Society has building space in Eastern Pennsylvania that looks like a football field; it takes forklifts to get the material moved around and still they don't have everything that people ask for. The earlier material is in high cost reprint by other periodical reprinters. So, some of the problems that the publishers now face in providing scholarly literature are circumvented or eliminated by micropublishing in various forms. I know that in our affiliation

Printing on Demand

with the American Chemical Society, I have learned much about their approach to packaging and handling information. I will attempt to reveal more of this to you as we go along.

Specialized Publishing

At Princeton Microfilm Corporation we specialize in micropublishing serialized or periodical literature with particular emphasis on retrospective files from Volume One. We offer these films both in 16mm and in 35mm. We feel that there are definitely two film markets at this time. We had a basic decision to make at the outset: should we select a continuous form or a unit form, or a combination of both. In our particular findings, and after personally visiting between five and six hundred libraries all over this country, I concluded that the continuous form was most appropriate for journals. I asked myself why. In the first place, librarians already have a lot of standard ways of doing things and if something non-standard is forced on them, it rubs them the wrong way. I could ask many of you why you bind your journals at a specific time each year. You would probably say that you bind them to keep them together, to preserve them, and for file integrity. This is the same reason why we selected a cartridge or continuous reel for serialized material. We do have the person who says: "I have reel travel to contend with; why can't I have material in the unit document form and select the particular issue for the page group I want?" You can; but, any time you manually massage or handle a file, the file integrity is questioned. You may have it all but it may be misfiled. You need a professional file clerk to keep it in order. I think that our decision to select a continuous microform for journals has proven to be right. Journals, as a rule, are indexed in several places. You are directed to a specific item and don't usually browse journal publication that they favor because of their specialty and they browse it (maybe to read their own articles again).

File Integrity

Costs

As a micropublisher, I would like to say that journal collections in microform have particular meaning when you consider the high cost of originals (which are scarcely available in complete sets, or in combination with reprints).

Duplicate Materials

I dare say there are many basic chemical files of which you could buy multiple film sets for the cost of one bound set. With multiple sets you could achieve great flexibility in satellite libraries. I think the term "satellite libraries" is being used more frequently. The economics of film collections, particularly for retrospective files, are in their favor. I would say the LOW referral of the older material doesn't warrant the HIGH COST of hardcopy. One should think in terms of a space versus use optimum. Whatever available shelf space we do have should be allocated to the material that is most highly used. This requires individual observations within each collection. THERE ARE NO TWO USE PROFILES THAT ARE EXACTLY THE SAME.

Libraries: Old and New

In micropublishing we classify our customers broadly into two categories: (1) the very old existing library that is kind of space-bound and has everything from Year One, and (2) the new library that has nothing but authorization and buildings to rattle around in with Federal and State monies to proceed. We feel that a retrospective microfilm program is meaningful to both. In some cases, the old library makes decisions to convert certain portions of their collection to film in the interests of space; and the new library will place their current subscriptions with publishers in serialized material in hardcopy and get their retrospective files in various microforms. This puts them in business quickly, and for a minimum of expense. This has been our marketing approach to these two types of customers. Another of our specialties is to provide a micropublishing service to large professional societies that offer both primary and secondary publications. We also have a sizeable government document collection on microfilm.

The ORIGINATORS of information, in the past, have been "on-and-off" about getting into the act, but micropublishing has come of age to the point where originators of information can no longer ignore it. They are now directly involved. The larger societies have the caliber of management on board that is aware of the changes and will control their own destiny. I'm sure that they all have paper printers now. If you were to take, for instance, Mack Printing in Eastern Pennsylvania: You could visit their reception room and see 125 or 130 journal titles they publish for various societies. They print and disseminate paper. I think the counterpart will be micropublishers who provide the same kind of service for many of these same societies on film. I believe we are in a time when originators are weaning their users off of paper, gradually. This year the ACS adopted a program of adding certain information on film that heretofore was not provided in the Journal, because of manuscript limitations and certain printing economics. The JOURNAL OF ORGANIC CHEMISTRY will contain additional information and data that the author felt would be valuable but the publisher couldn't put into the paper edition. For very little cost, it can be added, and we are now inserting it in the microform edition. What does this development imply? That the high cost of publishing 90,000 pages of literature a year in various journals, is at a point where they have to do something about it. They are taking varied approaches to reader selectivity and questioning the provision of 100% to the reader for the 5% that he may use. Some are tailoring the material down; institutions will get limited paper editions and a complete film edition will be offered at a subscription price. The individual subscriber to a particular journal will get the paper, but at the bottom of an article, if he is so interested, he will find a number, and he can get the entire full-blown text of the article in microfiche form by sending for it. This suggests that many things which are marginal now for publication, that just couldn't be published before, will get dissemination to interested readers in this form. It is a very practical solution. Envision if you will, a maximum of two pages per article instead of ten or more, gradually working down on the amount of paper. Let's say that the publisher provides the abstract as he does now, and instead of a complete text of the article there is something that is limited to perhaps two pages, a precis if you will, and he provides the full-blown text in microfiche only. This poses a tremendous number of possibilities from the publisher's standpoint. They can do so many more things

Publishers Shifting to Microforms

Limited Editions

with the same dollars. The advantages, I think are very obvious. And, there may be some disadvantages. Another approach professional societies are working on is to have their scientific articles in each journal provided in microfiche form for the individual subscriber. Bear in mind that little has been done for the individual subscriber, which makes up the preponderance of their subscription membership. Everything has been done for the institution: $5,000 cartridge programs, $2,000 reader-printers. We all know that you aren't going to have those in your little library at home. But, it is quite conceivable, really quite possible that the wide dissemination of a low-cost fiche reader will soon be a reality. As this equipment becomes as commonplace as typewriters and other such items in individual studies, a man can get articles on fiche. As a subscriber to a journal he may be getting something we mentioned as a precis, he may be getting an expansion of something like Current Contents. Some of these aids are good ideas, but they are just a beginning. There is more that can be done. These techniques represent repackaging of information in new ways through micropublishing means. I would say that the joint work involving paper printers and microprinters is already afoot. We are filming journals for several societies at this time. There are some unique things we want to try which we hope to announce this coming year. Our chemical collection is in the magnitude of ten million pages on either 16mm or 35mm. We have come to a point where "massaging the paper" provides added advantages. For instance, with the Engineering Index, if you put all the alphabets in the "a" section (all the way back to the beginning) into just one cartridge, you could conduct a search very nicely on film by jumping from year to year in a single reel or cartridge. You would have all the "b" sections for 50 years or 80 years back together, and all the "c" sections together. If you were doing a search on "carbon arc" you could pull a "c" cartridge and search from year to year within that one cartridge. That couldn't have been done back in the early 1900's. While we have a complete set cut and laid out, we can resort the pages in an intelligent way; a reorganization

Journal
Subscribers
Editions

New
Assemblage
of
Data

would make it easier to use a film than to use the original books. Most of you are familiar with the U.S.G.R.D.R. (U.S. Government Research and Development Reports). Well, we have extracted the pink pages, and the yellow pages, and we have repackaged this so that like data are together on film. This is something that I think represents a real challenge for micropublishers. We can develop new ways to arrange this material as part of micropublishing. Many of you are familiar with Excerpta Medica. This is published in many sections to a binding. This can be resorted (the pagination means absolutely nothing since it is indexed by the abstract number), the pages can be rearranged in such a fashion as to give greater use and efficiency to the film form. We hope to announce some of these in the coming months.

New Arrangements of Tools

I think that we might note how keypunching was eliminated in many cases in the data-processing industry. I walked down Madison Avenue when I was right out of school and looking for a job; I looked in a window at a tremendous computer with tapes and wheels flying around; boy, I tell you I was really dazzled. I had no background in data-processing whatsoever, but I said: "Wow, that's the thing to be in." Really, it excited me. So I went in and walked across the plush carpet and they had two or three very attractive girls loading and unloading tapes and pushing things up and down. It was really great; but, I didn't understand a thing about it. I got to chatting with a fellow there and he took me behind the wall where I saw a sea of keypunch operators banging out cards, kind of like a hardware shop, they were creating the input; but you never saw that seamy side from the street. You only saw the exotic "Gee Whiz" wonder. Well, I think that even at that time they were working diligently to eliminate the keypunch function. All the oil companies were crazy about going into data-processing and they had to find a way to optically scan and read the characters so that they would have the fast input for their high-speed processing. I think what's happening with the use of COM and other devices is that we are going to get to the place where lots of scholarly

COM Output

literature (that isn't dependent on advertising like the trade journals), the hard-core scholarly journals will be generated by COM; the masters will be generated and we will eliminate the judicious, grey-haired ladies turning pages. We will get a master and the publisher will give his microprinter the master. The micropublisher will generate copies of this master in various formats and disseminate it in film form. Chemical literature is voluminous, deeply indexed, and it happens to be an industry where there are lots of dollars; they are willing to pay for the new and useful information services. We didn't direct ourselves to the chemical industry by intent, it just kind of happened that way.

Available Hardware

As micropublishers, we are very concerned about the caliber of hardware available today. Obviously, when you tell a patron of a library that he must use a piece of hardware he becomes disenchanted when it is not reliable, and if it is something that requires a person's becoming interested in nuts and bolts for a few minutes he gets his mind off what he is looking for and he doesn't like that. We have all had experiences with inadequate microfilm equipment. But I believe, there ARE some respectable pieces of equipment on the market, though not as many as we would like to see. As to whether you are particularly pleased with a certain manufacturer or not, in the cases I've traced down, nine times out of ten this degree of satisfaction or dissatisfaction is mainly because of the degree of service provided. I know of a very large pharmaceutical library that has about 3,000 cartridges of our film. They have two pieces of equipment, both of which were down last week. Obviously, that was a crisis. Either they need more equipment or the manufacturer that services them should do a better job. We went to the particular manufacturer and said that these people are proponents and advocates and users of microfilm, that they participate in many national meeting and are in a position to say that they are favorably inclined towards microforms in the library, that it serves their information needs very well. But further, they can say that "it is great but the equipment is not reliable." The library wanted us to reload those cartridges into other type cartridges for a different machine.

This is expensive and we don't like to see people jump around just because they can't get service. Now, this is a sad state of affairs when major corporations want this market and they don't receive it. I think the success of many data-processing firms has been directly related to the caliber of service that they have administered. I have seen superior pieces of data-processing equipment thrown out because a better sales force and a better service force brought in an inferior piece of equipment and kept it running. I know examples that I have been involved in where this has been the case. As far as the hardware is concerned, I am hopeful that more is coming down the pike.

Service of Equipment

To get into the hardware business requires a considerable amount of investment; the primary interest that the hardware people have had, has not been libraries, it has been commercial firms. It has been banks, it has been brokerage firms, it has been everything but libraries. It has been kind of like; "Hey, maybe we can sell a few of these to libraries." They have not specifically said: "What does the library need?" The one good item libraries had for years was the MPE reader. This was very reliable. You could be in Podunk, Idaho and it would stand up. You could change the bulb easily or clean the glass.

The effect that micropublishers and libraries can have, in groups, will be worthwhile. It is already taking effect. I participated in something at the SLA this year which led me to believe there is still hope because other companies are interested in the market, formidable companies, companies capable of national service. Its more than just the two or three that we know of; there should be eight or ten. When competition gets into the game and the dollars are there you get refinements; you can go to the moon if you want. When industry decides to put real expertise into this field it will be just a matter of time.

Anticipating Progress

At PMC we have a consumer test room to compare readers and reader-printers. It is really a sort of showroom. We have about 45 pieces of equipment, readers and reader-printers

Comparing Equipment

Continuity

ranging from the IC-4 image count to the 3M counterpart, and down to inexpensive and portable fiche readers. This is one room where a person can go and try out many pieces of equipment with the same piece of film. This makes a fair comparison. We don't sell or represent anybody's equipment. We do feel as micropublishers we should evaluate it and have an opinion; and if people ask us what we like or what we dislike we tell them for nothing because we feel we are entitled to our own opinion, however ridiculous it may be! At PMC we will MAINTAIN CONTINUITY in the areas where we have already developed collections of significance. We hope to add a few more specialized core collections in the coming year. One definitely will be in the field of law. In closing, I would like to say that each year that passes brings refinements and progress. Thank you.

KARL K. KLESSIG

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NEW FORMS

My topic today is called "New Forms in Micropublishing." In looking at it from our point of view I think a more appropriate title, considering what we have heard from librarians, should be: "Does Industry have a Responsibility to Either Limit or Not Use Anything but What is Already Existing in the Way of Microforms."

Limitation of Forms

We have heard this morning from other micropublishers that one of the problems perpetrated on libraries by micropublishers involves the types of collections that we produce. This is certainly a very real area of controversy, a very real problem; it is not easy to decide what should be provided. The second problem has to do with deciding upon a format, determining how the material should be made available. I think it is generally recognized today that new forms are becoming a way of life. More and more new forms, differences in size, differences in reduction ratios, in arrangement, almost anything you can think of is being tried. We do recognize what this is doing to the library; obviously non-standardization of material and of how it is used, how it is stored, and how it is duplicated, these are all seriously taxing the library in terms not only of money, or space, but in trying to decide on what should be done about introducing microforms in any large quantity into the library. We at Library Resources feel that we are quite a natural choice to discuss this since we are right now at the forefront in trying to establish another new form and we see all of the

Diverse Forms Tax Libraries

opposition. We have had many discussions about it and we are trying to logically move ahead in the direction that we have chosen.

The big question, of course, we have had to ask ourselves, and that the librarians are asking us, is "Why?" Why start another new format? Why does anybody start a new format? We are not unique in this; other than COSATI any microfiche is unique enough. If fiche looks like COSATI but arranged differently, and if you have to use a different reader, you are still non-standard. The question we ask ourselves (and I think it is a logical one which we are asking librarians to ask of themselves) is "Have present microforms, systems, formats, really satisfied the library community?" Have they really provided what was needed to make microforms more useable. We think it almost silly to think that any one microform can best serve all needs. We have heard discussions this morning about microfiche and of the natural uses for roll film. Looking at these two types of microforms, one of the problems is the effort it takes to get an American National Standard. It is a laborious task and like saying that you can only pass a Bill in Congress if everyone votes unanimously for it. They have selected two standards in microfiche, the most prominent one being the COSATI. The reason for that was logical; having a 60-page format, 60-page capability, this allows one to accommodate the types of materials that were going to be presented on it. Similarly, we know that roll film, especially for newspaper collections, have definite merit. It is very inexpensive, and there is no reason why newspaper collections shouldn't be produced in that form.

Most Materials Non-Standard

Our program, programs at National Cash Register, Bell and Howell, and a couple of other firms, are trying to look for particular solutions, and we feel that we are looking for a way to utilize microforms in libraries. That is what we are supposed to be talking about here today. When we first started looking at libraries, it was hard to believe the tremendous amount of microforms that were being made

Solutions for Libraries

available, the way they were being treated, and the little use they were getting from patrons. To call their function "archival storage" would even be an understatement. You could look at any college or university library and see hundreds and thousands of dollars represented by microforms just sitting there, getting maybe one hundred or maybe two hundred requests for an entire year. Obviously, something was wrong. We have all tried to look squarely at this and have asked: is the problem strictly one of equipment, or of bibliographic control, or even of forms. Forms by themselves are rather meaningless. If the material is made available to the user in the most convenient and easiest form, he shouldn't concern himself with how it comes about. The librarian, naturally, has to look to the economics of it, so obviously that is where the battle begins.

Current Non-Use

The thing that we have felt most strongly about in our investigations, our evaluations, and in working with the library community, has been this problem of utilization. We talk about the number of uses. You can look at the study that was done here at the University of Denver, studies done by government agencies, and the studies that we have done, data that we have compiled, and it is rather unanimous that people don't like to use microforms. The people that do like them, almost all like them because of the fact that the material is available which couldn't be used otherwise, and not because microforms are something they really enjoy. If they have a choice, it is always "back to the book." We think that idea can be changed -- we know it can. But, we must ask ourselves, what is the best way of changing that.

People Dislike Microforms

When we talk of useability, the very first, number one criterion has to be QUALITY. If the film itself isn't going to provide a good legible quality-type image on a screen there is no person that is going to read a microform rather than a book. So, quality is certainly a criterion. Quality lends itself in some very interesting ways into format. Microfilming, while it is part of the photographic science, still has a lot of art attached to it, and there are quite a number of things that can be done, quite uniquely, to

Quality and Art

provide more quality than that available in the original book. We know from experience that there is no reason why the quality on a screen, from a good microform, can't be as fine or better than the quality of the original text. It can be done. We have found out that the easiest way of doing this is, in effect, to play some games with books and films as far as reduction ratios are concerned, and in how they are put on the fiche. In working with something like this, it has become rather obvious that new forms proliferate out of just trying to come up with something better in the way of quality. Another useability factor is, obviously, the retrieval of the information--retrieval for use of the information. We talked about roll film and its many different formats, different sizes, 16mm and 35mm, even 105mm in roll, trying in some way or another working in conjunction with the equipment to make the material more available to the user.

Unit Retrieval

In one of the discussions this morning there was mention of a unitized record. In our program we are working essentially with books, bound volumes, monographs, multi-volume works, some periodical collections. We felt it was highly important to look at a unitized record, the idea of one microform for each book; we felt this would solve a lot of problems that microforms have had. Certainly, when you are trying to read a book, roll film does not provide the most convenient media if you wish to scan that book. By the same token, we felt that while low reduction microfiche can easily take care of 20 or 30-page government documents and publications, to think of the average 300-page book requiring eight or ten cards would provide such problems in retrieval and loss that these problems would far exceed any benefits achieved by putting it on microfiche. The unitized record, as we know it in book form, has come about as an actual evolution, and we think it has now come about in microforms also. When you talk about unitized records, microfiche is the one that comes most to the forefront.

Another problem that is becoming more and more obvious is the problem of readers. There are a great many readers and viewers in the field which were designed, almost universally, for commercial-industrial application. With microforms, when the material is used, the patron must go over and sit at a device and spend time using it. It is hard to find a place in any research study where people have said they were satisfied with the way microform readers work. Again, this is a problem of the reader manufacturers not knowing where to go and where they should place emphasis in improving themselves. The library market is confused and we have found that in coming out as we have sponsoring a microform program, we have had great difficulty in finding reader manufacturers to produce what we feel is a requirement for the library market. Even such niceties as guaranteed orders, guaranteed quantities, almost freedom from restriction on price, still did not impress the reader manufacturers.

The Readers

As far as we were concerned, and the other gentlemen up here have had the same concern, we have had [illegible] question of what can we do to better serve the library market, and reader improvement is obviously a very great part of it. Reader improvement doesn't necessarily have to tie in with new forms, it doesn't have to tie in with a new format, but as you start manipulating your data, arranging your information, you find you can do a lot more with it if it is in a certain format. A rectangular grid system (we happen to be using a 50 by 20-frame system) has allowed us to come up with a very easy retrieval mode because we can get to any page very easily. Obviously one cannot do this nearly so easily with a 14 by 18 configuration.

Grid System

We have been shown a little this morning about new forms that have come out that look almost like the old forms we have been getting used to (we call standard the 4 by 6, but saw five or six different variations of this). There isn't a great deal of compatibility among them but they were each put together for a given purpose. We now have the introduction of the high reduction micropublishers, of which there are three of us right now; all three at different reduction ratios and with different formats; all three designing their systems to accomplish their concept of readability. Everyone is

Time will Judge Forms

very much convinced that they have made the right decision to best satisfy their market; naturally, time is going to be the only criterion that is going to tell, but I think we feel sure of ourselves that these systems must be given time to either prove or disprove themselves. We can't automatically say that any system will never work in a library. We could talk about the proliferation of new forms endlessly, and get many comments and criticisms on the subject.

It was suggested that I describe a little of what a user-oriented program can be and why a new format may be required to satisfy this particular need in libraries. We started our program looking at a total system design; we had only one objective in mind and that was useability, so we looked at microform problems. They were very real. We looked at reader problems. They were very real; they exist. Both of them can be solved. It may take a lot of effort to do it but it can be done. We looked at retrieval problems and there we got into an interesting situation because retrieval, per se, (if at all) didn't exist for microforms. What served users most frequently retrieval systems already in existence for books. We felt that is micropublishing was to do a job, then the format, the designing system, should definitely take into account the problems that are inherent in book retrieval.

Costs and Shelving

The most common problems are the cost of getting a book on the shelf and retrieving it for circulation, and the difficulty of getting it there in the first place. As most librarians are well aware, it is becoming common practice to have 6, 9 and 12 month delay in getting a book on the shelf because there isn't adequate staff, or adequate financing, or adequate time. Acquisitions continue on, replacements continue on, but cataloging preparations do not. So, definitely improving retrieval capability at the expense of introducing a new format can make sense.

Another item we had to concern ourselves with was in regard to reduction ratio. When you look at books on a screen, the most common thing is to have the book filmed

Image Enlargement

in reduction and then blown back to that equivalent magnification yielding a unity system. This is what most microform systems allow. But what happens is that even in the best microfilm, and even with the best reader, there is still some difficulty, more difficulty actually, in reading on the screen. One answer is to improve the contrast, but as much as we try to work on contrast, which is really the most important criteria rather than resolution, there is certainly a limitation as to what can be done in a rear-projection system. In our case, we use variable input filming, (with high contrast films and readers) we film a book according to the information area size, and then we blow it back in most cases larger than the original. This gives an interesting effect known as "image enhancement." It is something that can be done very easily and can be easily accommodated in certain types of formats, certain modes, including the ones that have been in most common use and acceptance in the past years.

Quality of Two-Step Filming

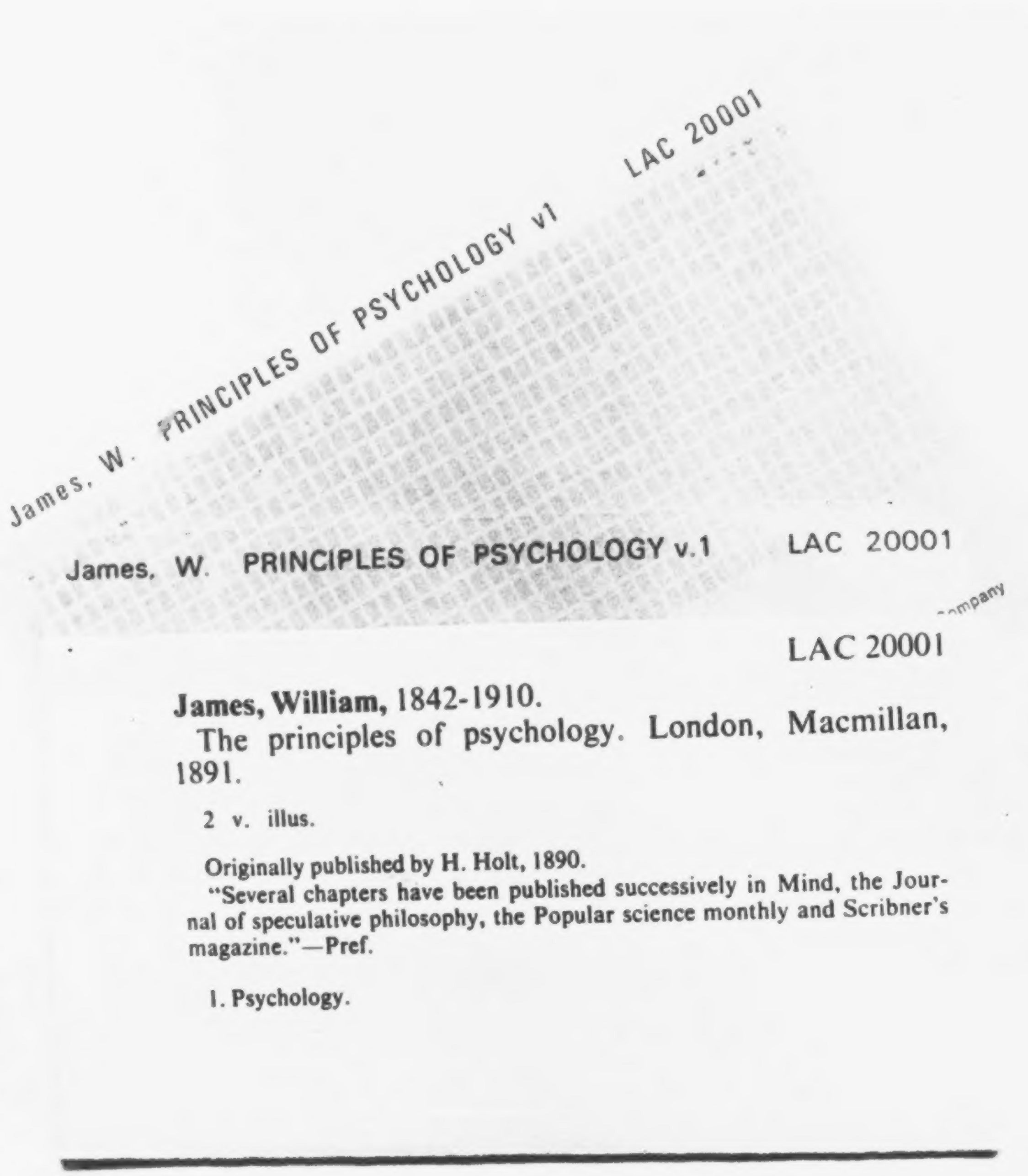
We had to concern ourselves with quality to the user and the two-step filming provides something very interesting and unique. We have been able to wind up in a high reduction output, with quality that is higher than that available at low reduction. The fact that it works (and has been verified by all experts across the United States and Europe) brings up another interesting point. Should we have lowered our magnification and reduction and reduced the quality going into the film? Those familiar with studies done at the National Bureau of Standards and the National Library of Medicine know what happens with difficult-to-film material (which every single book happens to be). Fine print, light print, high background, bleed-through, guarantee that you can lose information if you go above approximately 12x. Now, 12x is very low, which brings up another problem; it makes any type of storage become large; it can make your storage medium larger than your original material if you want to guarantee capture. But the alternative is that you can go up to a higher magnification and run into problems with some materials. In our case, we are filming all of our material below 10x, and then taking this film and putting it into a second camera, where we have better control, and we come out with image quality that we can guarantee on dissemination copy, higher than what is commercially available today.

Bibliographic Support

Another area which demonstrates the need for possible different formating is bibliographic support. We have found that better bibliographic support is definitely necessary. We are not going to deliver microforms and have them sit, so we are providing a rather expensive support in both subject, author, title, book catalogs, fiche catalogs, catalog cards, and topical index, where we are indexing all the chapters of the books we are producing. We found that we could do this more efficiently, come up with a better package, by concerning ourselves more with the needs of the user, rather than by making certain we did not digress from existing forms.

Present Equipment and Materials

I think the thing that must be said in closing is that we recognize that new forms are coming; we haven't seen the end of them. We are hoping that there won't be too many more--that they won't accumulate to the point where so many forms are available that nobody will want anything to do with them. We believe some of the new forms will become standard and we are working actively to try and promote that. But, we think the worst mistake the library can make is to, automatically, rebel against a new system, or new programs, or new forms, just because of the fact that they create problems with equipment already in the library. If anybody really feels that the current equipment and the present programs are totally solving the users needs today, then that would be more than justified; but there isn't one librarian that has come forward to say they are satisfied. We feel it is very important to make a serious attempt to investigate, evaluate, and look at the merits of what is coming up. For anyone that hasn't seen our commercial venture, it is about as different as you can get from what is currently available; the microfiche is approximately 3 by 5 in size, and has its format designed around a possible 1000 pages; it has an individual envelope with complete bibliographic citation on the face of the envelope, and we've spent quite a bit of effort making sure these citations are verified and updated information. This represents one of the new formats that is trying to provide library materials to the user in a way he may accept it on microform. Thank you.


James, W. PRINCIPLES OF PSYCHOLOGY v1 LAC 20001
James, W. PRINCIPLES OF PSYCHOLOGY v.1 LAC 20001

LAC 20001

James, William, 1842-1910.

The principles of psychology. London, Macmillan, 1891.

2 v. illus.

Originally published by H. Holt, 1890.

"Several chapters have been published successively in Mind, the Journal of speculative philosophy, the Popular science monthly and Scribner's magazine."—Pref.

1. Psychology.

Klessig - Figure 1. Samples of Library Resources Microfiche.

JEFFREY PEMBERTON

Mr. Pemberton is Marketing Manager for the New York Times Information Bank. He formerly was Director of Communications for Aspen Systems Corporation. A journalist by training, he graduated from the University of Michigan and was once a reporter for the Wall Street Journal.

RETRIEVAL

Systems
Education

I am going to talk to you about retrieval. After listening to Dr. Nelson's remarks yesterday about the "point of readiness," I thought that concept would be most appropriate in talking about the Times Information Bank. Certainly the *Times* management, after spending several million dollars, is ready. But, I remember walking through the newsroom a few days ago when we had just taken delivery on a couple dozen of the new video terminals. These terminals hadn't been hooked up yet but they had been put in place near the area where the reporters will be using them; on one of them there was a note which said: "This machine is going to replace Harvey Craig. Please plug it in last." Fortunately this was a misunderstanding, but it does point up the inevitable education problems that confront us in the introduction of any new information retrieval system.

News
Data

(Figure 1) Here is about a tenth of the *Times* morgue; that is the basic reason we are doing what we are with microforms. The *Times* morgue goes back 50 or 60 years and we have just about grown out of it. (Figure 2) Here a gentleman is withdrawing some material from the morgue and you can see that this is a typical morgue folder, full of clippings. They are deteriorating, of course, in the New York atmosphere. The Times Information Bank is a combination of the printed index and the morgue. (Figure 3) Here is the printed index, going back to 1851. There are only a few years missing between 1907 and 1912. There was an austerity wave on and so there was no index at that time, but we are back-tracking (it is a laborious work but we will fill that in). The Information Bank is a combination of the

The Information Bank

printed index, (that is, the summaries and abstracts in the printed index), and the material found in the morgue. It is also a combination of material in abstract form and full text in microfiche. The in-house version, will be completely automatic, with digital abstracts and microfiche displayed on the same video terminal. We will have about forty of these terminals scattered throughout the newsroom and the specialty areas (such as education news and business science). From the standpoint of microforms, the automatic in-house version has some interesting features. It was designed, after extensive surveys of user habits and preferences, to allow users to continue their old retrieval habits but, at the same time, to offer some inducements to rely upon abstracts for at least half of their information needs. Built into the system are some constraints which tend to nudge the user toward using the complete system, rather than merely using it as an electronic substitute for the old system. The old system, I should mention, is one whereby a reporter who needs some research information, goes down the hall to the morgue counter, tells a morgue clerk what subject he is interested in, and the morgue clerk digs it out and hands him the clipping files. He then proceeds to go through the clipping files and, in the process, he may lose some of the clippings or he might stuff some into his pocket. Theoretically, he is supposed to return everything before going home at night, but you can well imagine that file integrity in a system like this is seldom maintained. One of the big problems in the system is that because the integrity is bound to be bad, you don't know whether you are missing anything or not. Also, since it is a full-text system and there are deadlines to meet, people try to go through a file as fast as possible as deadlines approach. It would be possible to go through a Times newsroom and see people with a file out and two piles of clippings they are going through looking as fast as they can. This is what we are trying to remedy. The system was conceived in 1965 to develop the information bank; it began to get off the ground in 1967, and my boss, John Rothman, tells the story of being summoned up to the office of Clifton Daniel. Mr. Daniel said: "Dr. Rothman, I just got some material

The Old System

Totally Computerized Retrieval

The Collection

from the morgue and there are only 11 stories on this subject but I know there are 12." As diplomatically as possible he was told: "Well, you are lucky because you at least know that one is missing. In most cases you would not." So, following that conversation and some others, the Times management decided to go ahead with a totally computerized information retrieval system and to eventually phase out the morgue and substitute microfiche for all the morgue material; early next year we expect to stop putting new clippings into the morgue, and instead we will have microfiche. I am trying to give a description of what the total system is like; as in all computerized information retrieval systems, we have a data base and software, some of which is designed to give access. Unlike most systems or data bases, we have a most unruly collection of documents. They range from everything from the stately pages of Foreign Affairs Quarterly to the not so stately contents of Ramparts magazine, the reason for that being that in recent years the Times has started to clip many, many publications, many non-Time publications. Historically, the morgue has consisted of the Times and a few other publications, but in the last four or five years we have gone to clipping between 60 and 70 other publications. About a third of these are other English language newspapers ranging from the Los Angeles Times to the London Times. The remaining two-thirds are broad-interest magazines like: American Banker, Atlantic, Business Week, Ebony, the Economist, Forbes, Foreign Affairs, Harper's, Industrial Research, McCalls, the Nation, New Republic, Psychology Today, Ramparts, Saturday Review, Science, Times of London, U.S. News, and Women's Wear Daily. I could go on and on, but that gives you an idea. We also have the basic foundation, the smorgasbord of editorial fare that is contained in the over 1000 pages that make up one week's worth of the daily and Sunday Times. Our information bank (which will be operational in April) will start with the abstracts from the Times Index. They will be the same abstracts that you see in the Times Index with which everybody is familiar. We have the years '68, '69 and '70 in machine-readable form, and on "D" Day when we start up

Abstracts

Priorities and Purging

Indexing

we will have it current up to that point within 48 hours. The system will be updated every 48 hours from the standpoint of abstracts and also from the standpoint of microfiche. In January, we will begin to abstract non-Times material which will be fed into the computer. It will also be put on microfiche and for the in-house version we will have abstracts of the nearly 70 other publications. We will be abstracting the non-Times material on a selective basis; if another publication, say the Washington Post, covers an event in a little different fashion from the Times, then we will abstract it. If another publication covers the same event as covered by the Times, but to a lesser degree, and provides no new information, then we won't cover it. In the case of non-Times material, that will be on a selective basis for magazines also. Scientific American, I think, will probably be abstracted in its entirety. At the same time as we begin abstracting new material, we will begin to go through the morgue on a selective basis and abstract its retrospectively. At first we will have the major categories that a newspaper has to have, usually the bad things, war, problems with the environment, social problems, politics, and such. Eventually, most of the Times morgue will be in the Times Information Bank and we will purge material as we go along. Nonetheless, this is a monumental task and it is going to take several years to complete. Our morgue contains about 20 million clippings and about 1.25 million names of individuals. There are about 80,000 index terms which we call "descriptors." (Descriptors can be called "index terms" or "subject terms.") We think we are going to enter about a quarter million new abstracts into the information bank every year. At the outset we will have about 150,000 descriptors, most being people's names. The entries into this system will vary from a transcript of a Presidential speech (which might be quite long and yet have only a few descriptors to a column) to an advertising column which could have a number of separate subjects contained in it and quite a few descriptors. We think we will put in about 22,000 new descriptors a year. Most of these will be people's names, of course. But the system will be responsive to users, both internal users and outside subscribers. If a new term is suggested, we will give it serious consideration and the chances are we will put it in. An example is one that came up recently; Suffolk County in Long Island banned the sale of detergents. They weren't so much worried about the phosphates (as is usually the case) but about the other main ingredient which is called a surfectant (the stuff that causes the foaming). It seems the water in Long Island's Suffolk County is pretty foamy. Now this is a case where someone was searching our system for the work surfectant.

Programming the System

We think we will average about six descriptors per abstract, but that is rather misleading because some abstracts may have only one or two. A story narrowly specializing in content would have few descriptors. Other stories may have quite a few. This gets us into the characteristics of the software, which is now being completed by IBM at their Federal Systems Division at Gaithersburg, Maryland. The IBM'ers have been in recently and camping on our 7th floor so we are getting close to the time when we will have formal systems testing (which is scheduled to start in late April). The software itself, of necessity, is a rather sophisticated system because one of the prime criteria of this is speed. We've got to get information very fast and we will be using a system whereby you can link terms such that you can say: "I want this and this, but not that." We can link descriptors up as we please. Then we will have some non-descriptor parameters. We can ask for material by "by-line," by the individual who wrote it; or for only reviews, or only editorials; for only publication sources; or for 10 or 12 different categories. As to dates, we can get the most recent materials first, or we can get the earliest, or if we get the earliest, we can then hit keys and skip forward.

Built-in Thesaurus

The system has a built-in thesaurus and also a printed thesaurus. Some of you are familiar with the printed Times Thesaurus which we are now revising; this will be supplied to the user but he really doesn't need it. He can key-in some descriptors and before searching for any material, he can ask the machine to browse through the thesaurus; it will present on the video screen all of the related words that it has and the user can get an idea from that what he should look for: He can then search for more specific material.

Truncation

There is another neat feature to the system called a truncation capability. Suppose you knew someone's name was something like Peterson, but you weren't quite sure of it; it might have been Peters or Peterman and you really didn't know much about the individual. You may have known he was a Judge, let's say, but you didn't know his first name. You could key in on the video terminal keyboard (which is just like a typewriter) the descriptor Judge, and just the trunk work Peter. The machine would come back with all of the Judge Peters, Petersons or Petermans, or whatever spelling it had; you could then say "Charlie Peterson, that's the guy." Then you could key in his name and the system would come back with whatever material it had.

System's Use

To use the system, a person simply sits at the keyboard, keys in the descriptors, and converses with the machine in English; there are no codes to it. Bear in mind that this machine system was designed to be used by reporters as well as outsiders. It was designed to be used by reporters working on a deadline basis. Some of these people, brilliant though they may be, can manipulate mechanical equipment well and others are totally helpless cases. We have had to design a system that almost anybody can use. Still, I think there will be a little bit of hesitation on the part of anyone and we will have a training period to go through; whenever anybody sits in front of a blank, unblinking eye like this video terminal will have, they think: "Gee, I'm on the air." There is a little bit of education required. After keying in some descriptors into the machine, it will ask you if you wish to qualify your search, if you want to narrow it down.

Example

As an example, two days ago there was an oil refinery explosion and fire in Lindon, New Jersey. If we were looking for that we would key in oil refinery fires. If we let it go at that we could get back quite a bit of material. So, under oil refinery fires, the machine would come back and say: "Do you want me to dump the file; is that really what you intend to do." If you don't, you might key in United States. Then you could narrow it further and key in the word sabotage. You could go further and key in the word revolutionaries, or be specific and say Weathermen. You would then get a limited amount of material. Or you might key in only the last three descriptors, United States, sabotage, and revolutionaries, and omit the term oil refinery fires, and you have all other acts of sabotage as well.

Image
or
Hardcopy
or
Film

Now, getting to the microfiche part, you will see abstracts on the screen and they will average about 30 words. Some will be very short but some may run to 300 or 400 words. If a hardcopy is needed, you will depress a key and hardcopy will be turned out at a remote station and put into a pigeon hole where it can be picked up. If a relevant abstract is found and you want full text, you can get it in microfiche form by pressing another key. Then an automatic retrieval device, made by the Foto Mem Company and designed to Times specifications, will swing the appropriate microfiche into position before one of four television cameras. This will take from 7 to 15 seconds. The microfiche will then be displayed on the screen. If the user wants to get hardcopy, again he presses a button. At this point manual effort takes over; somebody has a manual file back at the central station, pulls the copy out, makes a hardcopy and sticks it into the pigeon hole for pickup. (Figure 4) Here is our terminal with some abstracts on it. You can see the keyboard is a straight typewriter kind of thing. You can see the function key. (Figure 5) Here is a Foto Mem with dress on. (Figure 6) Here is a machine up close. These are the cassettes. There are 10 tiers; on the carousel there are 50 of these plastic cassettes in each tier. Each cassette hold 100 microfiche. Each microfiche will handle the contents of the daily _Times_. The Sunday _Times_ takes about four fiche. So we generate about 10 fiche per week. We will have about 15 other fiche per week from non-_Times_ material, and this whole thing revolves around four cameras. (Figure 7) Here is one of the fiche; it is not a standard fiche although it is 4 × 6 inches in size. However, it has

The
Equipment

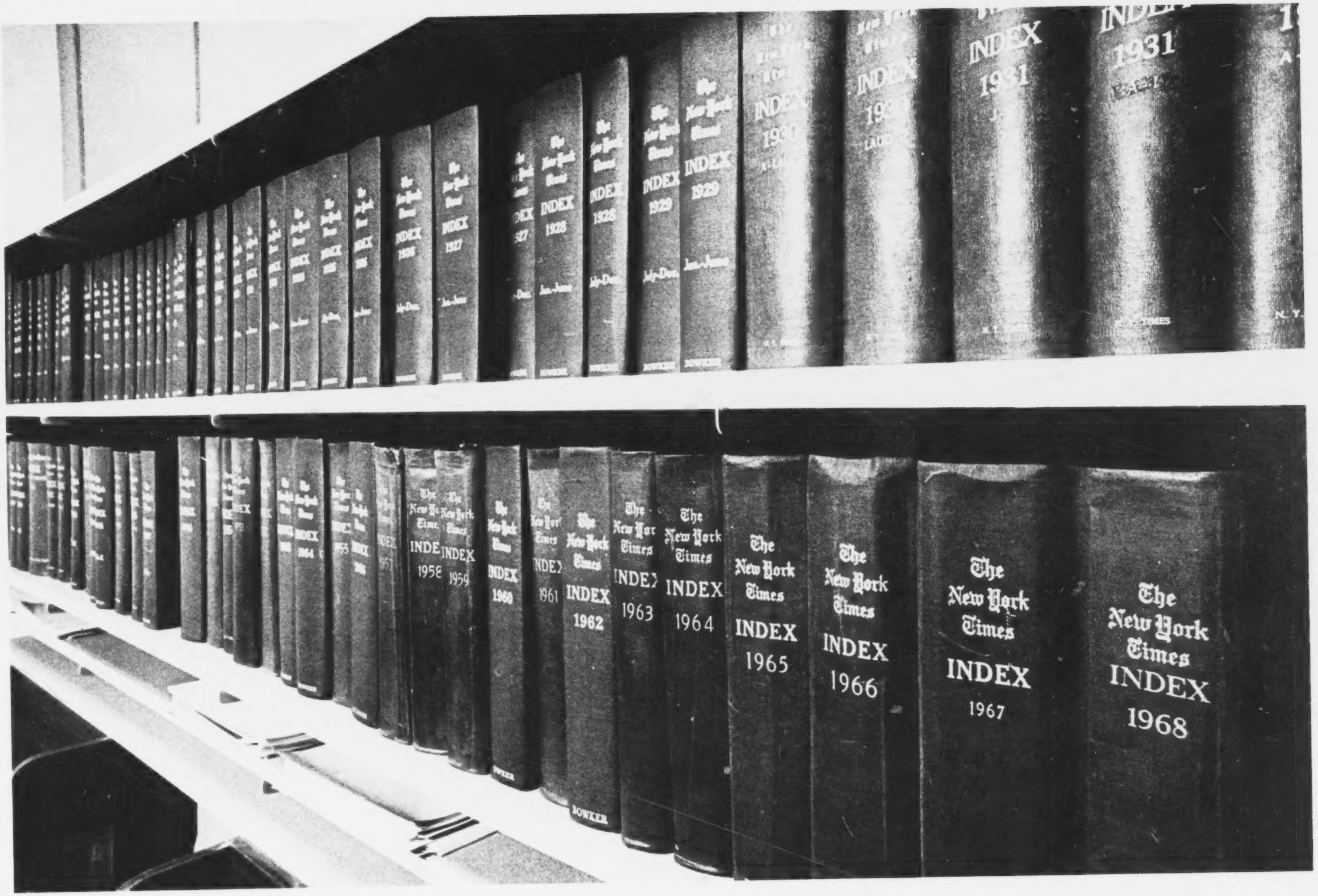
99 frames and the frames are horizontal. They are made that way because of the horizontal format of the video terminal screen. This big fiche can be used in any standard printer and we will be supplying standard printers to outside subscribers. (Figure 8) Here is a fiche on the screen.

Available to Outside Users

The system will be available to outside users and we will supply it on a subscription basis with leased lines to our computer in New York. A subscriber will have about everything that in-house users have with the exception of the automatic microfiche retrieval system (that is limited by coaxial cable to about 2000 feet from the source). We will not be able to supply fiche of non-Times material until we can negotiate copyright situations with other publishers. In the future, I think we will have full text of the non-Times material available in fiche to outside users and I think that the automatic retrieval will come as data transmission costs come down. Thank you very much.

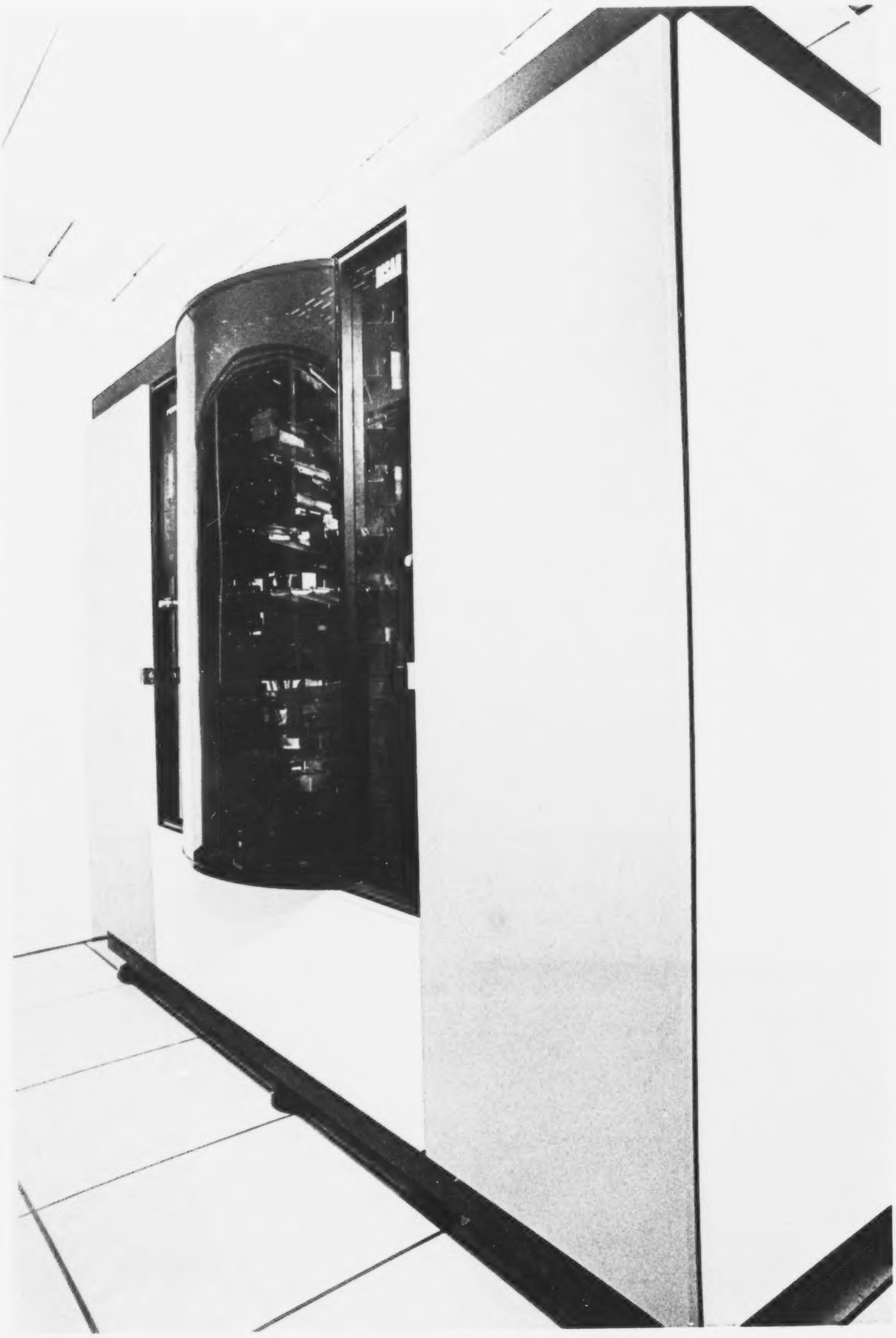
Pemberton - Figure 1. Part of The Times Morgue.

Pemberton - Figure 2. Withdrawing material from the morgue.

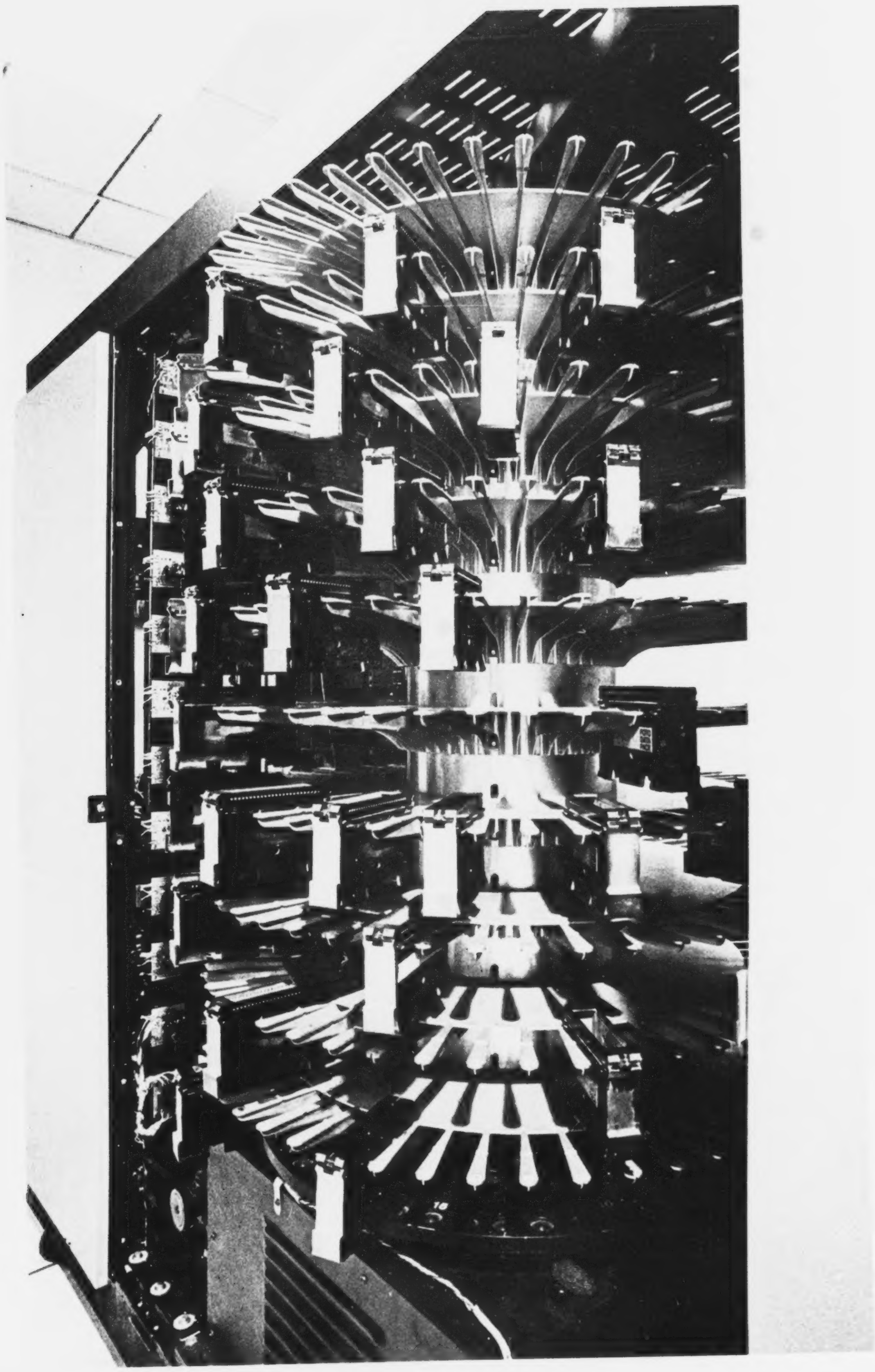


Pemberton - Figure 3. The Times Index.

Pemberton - Figure 4. Display Terminal.



Pemberton - Figure 5. Foto Mem.



Pemberton - Figure 6. Close-up of Foto Mem.

"All the News That's Fit to Print"

The New York Times

—NEW YORK, THURSDAY, NOVEMBER 5, 1970—

VOL. CXX....No. 41,193

15 CENTS

Weather: Cloudy and cool today; fair, cooler tonight, tomorrow. Temp. range: today 52-42; Wed. 56-50. Full U.S. report on Page 94.

NET GAINS ... R DEMOCRATS SEEN; NIXO... ES SENATE RESULT; ... IN STATE LIKELY

U.N., 57 TO 16, BACKS PLAN FOR MIDEAST SOUGHT BY EGYPT

Assembly Calls for 3-Month Extension of Cease-Fire and New Peace Talks

U.S. DRAFT WITHDRAWN

Both Israel and U.A.R. Will Still Honor the Truce Due to Expire Today

By HENRY TANNER

Special to The New York Times

UNITED NATIONS, N. Y., Nov. 4 — The General Assembly adopted by a large majority today an Egyptian-backed resolution calling for a three-month extension of the standstill cease-fire in the Middle East and for unconditional resumption of Arab-Israeli peace talks through Dr. Gunnar V. Jarring, the special representative of Secretary General Thant.

Foreign Minister Mahmoud Riad of the United Arab Republic, speaking after the vote, announced that he had been instructed to enter into talks with Dr. Jarring. He also said that his country would "further observe a cease-fire period of three months" in the Suez Canal area. The truce had been scheduled to expire at 5 P.M. tomorrow New York

U.S. Is Preparing Pressure on Soviet To Free Generals

By TERENCE SMITH

Special to The New York Times

WASHINGTON, Nov. 4—The United States is preparing to apply increased pressure, including a protest at the strategic-arms limi... talks if necessary, t... the release of an Arm... and four officers stil... detained two weeks a... landed in Soviet Armen...

The preparations were d... closed today by reliable government sources who also said that the two United States Army generals aboard the plane had been submitted to "lengthy and intensive" questioning.

The sources said Soviet military intelligence had interrogated them about the scope of United States military activities in Turkey and about the border-crossing incident.

The officers are being housed in a comfortable government villa, officials said, with two Soviet generals serving as their hosts. The

Continued on Page 17, Column 1

U.S. TO WITHDRAW DIVISION ON GUARD AT DMZ IN KOREA

Move Will Red...

G.M. SUES TO BALK U.S. SAFETY ORDER

Acts After Federal Agency Says Wheels on Thousands of Trucks Are Defective

Unit to Be Deactivated

PATTERN UNCLEAR

Vote Is Kaleidoscopic, but President Fails in Primary Goals

By R. W. APPLE JR.

James L. Buckley at news session at Waldorf-Astoria yesterday. With him is his wife.

Buckley Says He'll Join Nixon's 'Team' in Senate

By MAURICE CARROLL

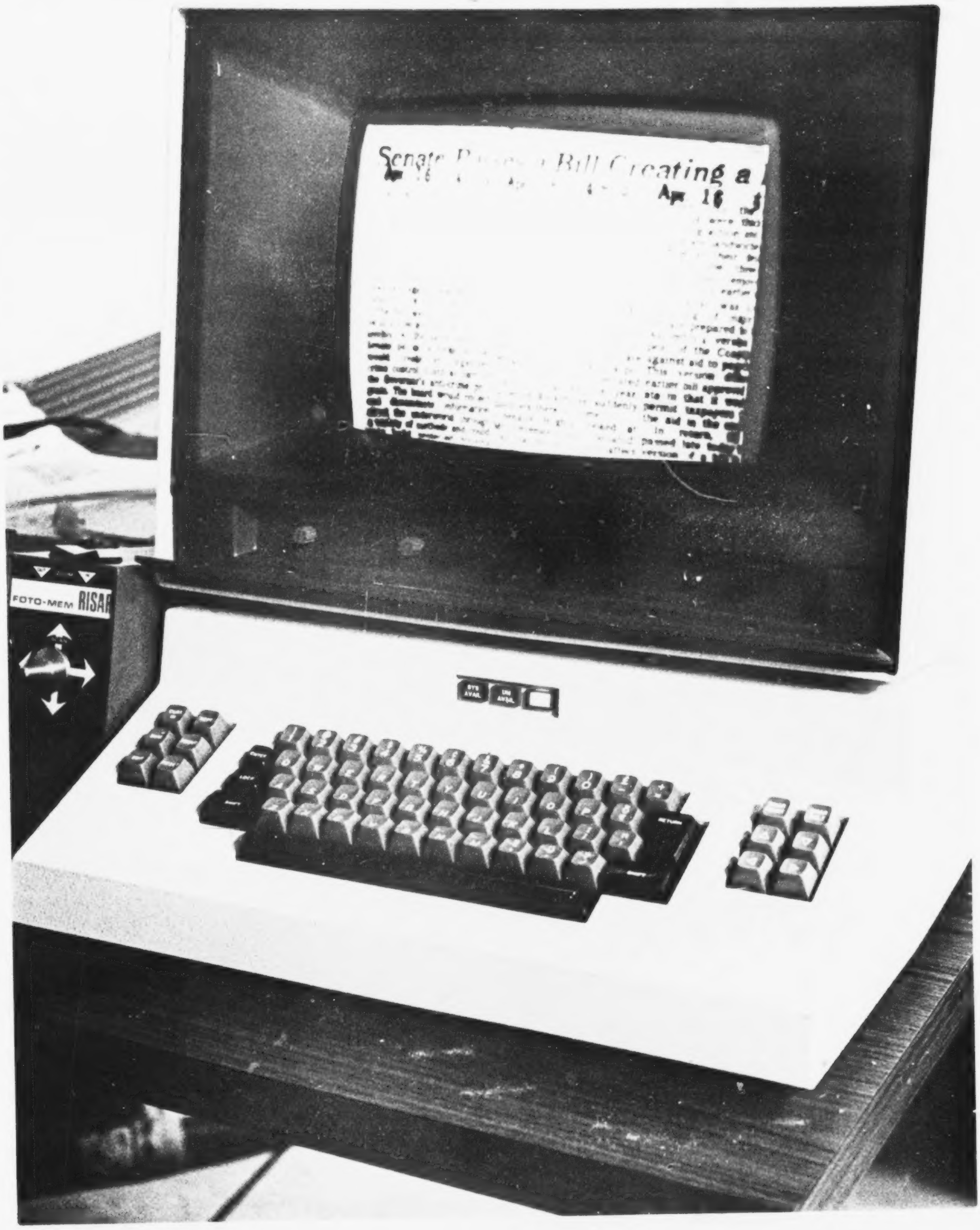
BOTH PARTIES SEE RISE IN STATE TAX

Higher Levies on Sales and Income Are Mentioned to Stem Fiscal Crisis

Expect Burns to Resign

PRESIDENT CLAIMS A WORKING MARGIN

Pemberton - Figure 7. The Times Microfiche.



Pemberton - Figure 8. Display of Times Fiche.

STEVENS RICE

Mr. Rice graduated from the University of Michigan with an A.B. in Languages, and with an M.A. in English Literature. He has held positions in Public Relations at the Michigan Technological College, served as Assistant to the Registrar at the University of Michigan and as Assistant to the Dean of Horace Rackam School of Graduate Studies at the University of Michigan. Since 1950 he has represented University Microfilms.

ROLL FILM

Introductory Comments

I am going to stand right here, if you don't mind, rather than moving over to the rostrum. There are two reasons for this; I may even sit down from time to time. After all, Allen Veaner sat down, and he is the only one this morning who noticed that the microphones are placed here and way over there, and not up in front; probably my colleagues have not been recorded. I am just going to stay right here and talk to you as though you were my friends. The last speaker mentioned something about the unblinking eye, and just at that moment I was looking around. Do you have any idea of what it is like to stand up here and look at the cold, unblinking eye of somebody like Carl Nelson, or to look at the unblinking eye of the Squash Records Champion of North Carolina? I tell you it is a pretty unnerving experience; but I have had instruction in this because before I left home I talked to some of my colleagues and asked them what they knew about these fellows that were to be on the program with me. I asked: "What is Larry Block going to say? What is Frank Crawford going to say?" And they said that they were pretty good fellows and would probably stay right with the subject; so I have had coaching in this. Since I have heard what they have had to say, I have a little different opinion because they have wandered over into the territory that was mine, and I will tell you why in a few moments; but I want you to know first of all that I feel rather like the substitute quarterback who had to be put into a game just after his team had gotten the ball, because the regular quarterback had been injured and taken out of the game. The coach said "Now, I'll tell you what I want you to do; you are only a sophomore and you haven't had much experience, so I want you to run into the line three times and then kick the ball as hard as you can; maybe on the next series of downs we can get our regular quarterback into the game again." The team was way down the field and this fellow went into the game and he ran the ball right into the line. It was something the other team wasn't expecting and he made twenty yards with it. But he knew the game plan and saw the next play. He ran it right into the line again and made another first down, and then he tried it a third time. By this time he was within reach of their goal; it was the fourth play so he kicked it as far as he could and the coach took him out of the game and said "Whatever happened? That was a pretty stupid thing to do." The boy said: "I thought so at the time, but those were your instructions." So regardless of what I now know to be the truth, that those other fellows have encroached on my territory, I tell you now the reason they did it was because you can't talk about microforms without talking about roll film because all microfilm begins with roll film. But anyway, I am going to stick to my game plan.

Raw Films

I am going to suggest first off that we have a definition, which I hope Carl Nelson will accept; my definition is this: "Roll film is film that comes in rolls." Now, virtually all raw films are roll films, and by raw film we mean film that hasn't been exposed to light in some way. During processing by micropublishers films may be cut, chopped, spliced, jacketed, inserted, or stripped; they are never torn, bent, or spindled. These changes in the form of roll film come after the film has been exposed, processed, and inspected, and prior to being used in some form of master copy. Of course, at this conference, we are not talking about the manufacture of film so I will limit what I have to say to the kind of film, the kind of distribution copy, which you would be apt to find in an academic library. There are some distinguishing characteristics of roll film which you ought

Sizes

to know. We have different widths: 16mm, 35mm, 70mm and 105mm film. The frame size on microfilm is not fixed but we can change it according to whatever we are photographing so that we don't waste space. The image size varies as a function of the size of the material being photographed, the type size, and the enlargement possibilities that one is going to have with his system. In other words, it varies with the kind of viewer or reader-printer or enlarging system that you are planning to have; it is important to know that image size has no relation to format except for the upper limit capacity of film width.

Image Positions

Now, the image position may be either cine, comic, or some other kind of position. Cine is the format used for motion pictures where the image is at the vertical with lines of type running across the width or short axis. In comic strip it would be just the other way, like a comic strip in your favorite newspaper. I don't suppose librarians read comic strips much anymore, except maybe Peanuts. I have seen Peanuts in an unusual format in my paper and that would come under "other." Now, we have already had a discussion of the modes of negative or positive, but nobody said anything about generations.

Generations

When you expose film in a camera, that is called a camera negative or first generation film; a positive made from that film would be a second generation, and so forth. Every time you go from positive to negative, to positive again, and have more generations away from the camera negative, you have a little loss, but that is one of the characteristics of film. Handling is another characteristic and there we find that some advances have been made

Packaging

in packaging because we have spools, cassettes, and cartridges. I used to get mixed up and didn't know the difference between a cassette and a cartridge. Now I know because all I have to remember is that a cassette encases the film entirely, whereas a cartridge does not. Incidentally, speaking of standards, as I was a few moments ago, I understand that in the military you dare not speak of either cassettes or cartridges in relation to microfilm or you will get into some kind of trouble.

Transport

Film transport, still under handling, may be either manual or automatic. Now, these are all characteristics of roll film I am speaking of. I'm not speaking of any other kind of film. The reason that roll film was used at the very outset for copying was because the processing steps and so on were adapted largely from the motion picture industry and they were already using roll film.

Why Rolls

As a consequence, we were able to buy processing equipment for printing and for developing and so on of roll film and could take that right over. There is something else you can do. We have spoken here mostly of microforms which are duplicated to another film, or used in another form. But you can enlarge continuously onto paper by xerography, and that is done in a roll form. It is a roll-to-roll process and it cannot be done by any process as economical and useful as xerography. Let me mention just a few of the advantages and disadvantages of roll film; this is the interesting part because so far I have just been factual in describing the characteristics of roll film, but now we get into an area where we have opinion and not fact; that, of course, is always more interesting.

What Message

We think first that the MESSAGE SHOULD DETERMINE THE MEDIUM so that the medium will not always be roll film. Just because I am talking about roll film doesn't mean that I personally think, or that my company thinks, that it is the best for all possible purposes. If we thought that, it would be the only thing we would use. It is simply that I am limiting this interesting discourse to roll film. I want you to realize, as we go through this, why I am standing here instead of over there. It is not really because of the microphones; I think that probably the other speakers were recorded after all, but it is mostly because I wear bifocals; if I put the paper down that low I can't see it; if I hold it up here I can't get it out far enough.

Bifocals and Viewers

I am going down another path now for a moment and want to speak of the trouble I have had with most microform viewers. I have to tip my head back and get up like this! I read an article in a paper about somebody in Detroit who was advising octogenarians how to use the voting machine where you have to punch something up high and they couldn't see the names with their bifocals on. This fellow wrote in to the paper and said: "Reverse your bifocals so that the focal part is on top." Well, that doesn't work if you have a little astigmatism because it throws you off. I was telling a couple of conference goers the other day about an invention I have made of a new kind of microfilm viewer;

it isn't appropriate to tell it here but I am going to do it anyway. Librarians are always complaining that you can't read microfilm in bed or you can't hold it in your lap like you do a book. Well, I have a microform viewer which I have only in the drawing stage at this time and it is in the form of a beautiful woman; the knobs are in convenient places; and it is just as awkward to use as any kind of microfilm viewer, and just as heavy, but you don't mind it so much. I was talking about this when Frank Crawford and Carl Nelson came over and Carl said he wanted to have a hand in the final design, and Crawford wants to market it. Well, I'm sorry I digressed a little bit. The reason that we used roll microfilm in the first place was not so we could save space although you do save space with it depending on a number of different things such as reduction ratio, format, size of film, and so forth, but mostly roll film was put into the library where the materials were that we wanted to get. You could get materials from distant places like the British Museum, for instance. There is no point in putting things on microfilm just to have them in that form. If you are going to do something creative because of the format, then that is a different story altogether. But, in the first days of getting materials, we didn't think of that because we didn't have computers to use with microforms; in collecting materials we did find that the roll film was better than anything else than we could get because it was easy to use and people could learn rather quickly how to do it. Minor variations such as density (don't forget that most of these things are going to be photographed in your library) can be compensated for more easily in roll film than in other forms, and it is a manufacturing advantage which affects the kinds of film that goes into your library. Now, for retrieval, roll film is easily coded and it retains long runs of material in coded sequence. That's a high-class way of saying you want to put your periodicals and newspapers on it. But random access isn't possible. If you have a book, you have random access because you can turn to any page in that book quite as easily as you can turn to any other page, but if you have all the pages in sequence on a roll of film that is difficult to do because you have to run

First Films for Libraries

On-Site Filming

Coding or Random Access

from one end to the other and that is a disadvantage. It is impossible to rearrange pages or sections of material easily and that is a disadvantage if that is one of the things you want to do. It does, however, have the lowest cost for copies made on demand, and for that reason it is very useful in libraries. This is what we call a straight-line cost. It is not like the cost of making a book where you have an edition process and you have the same kind of edition process in some of the other microforms as well. A straight-line cost means that once you have your negative master copy you are going to run that straight through from beginning to end in making the duplicate. Now, if you have large editions, the cost may be higher with roll film than in other forms, and if you know in advance the size of your edition, you know that you can sell all of the items in your edition, then this becomes a disadvantage of roll film. So, the cost may be high if only low volume is wanted, but comparative costs will still be low. Let me speak about just one more thing and this is really the nub of the whole thing, and that is CONVENIENCE TO THE USER. That is what we are all interested in and I don't think that we have seen the end of convenience by any means. I think we are just getting into that area. I think that if you look at the history of these various forms, how they have begun, you see the most IMPORTANT THING OF ALL IN THE INTELLECTUAL CONTENT OF THE FILM; I think that is paramount and overrides every other consideration and is the area in which I am most interested; and right along with that goes the RETRIEVAL of the film. We have talked a lot about it so I am not going to say anything, but as far as the mechanical part of it goes, I think the thing that has made retrieval and use and handling of microforms more simple are the cassettes and the cartridges; these are things that help on the mechanical level. As we said at the very outset, this is the most versatile kind of form; we used to say it was the most flexible medium, but we gave that up. It can be positive, jacketed, inserted into apertures, and so forth, and it can be used for continuous enlargement. Many people say they don't want to read microfilm but I think that film is going to get to the stage, more quickly than most of you think, where it is

Copy Cost

User Convenience

Content and Retrieval

Versatility

actually preferable to hardcopy. But, if a person doesn't want to read anything but hardcopy, if he doesn't want to read shadows, he can get hardcopy most conveniently and cheaply from roll film. Such are the things I see having to do with roll film which has made it easier for users to utilize. Thank you. Hardcopy

DALE GADDY

Director of the Microform Project of the American Association of Junior Colleges in Washington, D. C. Mr. Gaddy was a Research Specialist and Publications Editor for the ERIC Clearinghouse for Junior Colleges; he taught in a Maryland high school and served as Assistant Principal of a North Carolina High school. He earned his B.S. degree in Social Studies at Appalachian State University, M. S. in Audio-Visual Education at the same institution, and Ed. D. in Educational Administration at Duke University. He was a Kellogg Post-Doctoral Fellow at the University of California in Los Angeles prior to joining the staff of AAJC this past June. His current project, funded by the U.S. Office of Education, is designed to show under what conditions community-junior college students will utilize microforms in academic settings and the effect such use has on them.

MICROFORMS IN THE CLASSROOM

Introduction

Appearing on the third day of a program such as this, and trying to develop something interesting and new and some way to deliver it effectively is a pretty difficult task; to follow such an excellent presentation as we had on that film from Stanford just a moment ago makes it additionally difficult. Now added to all these difficulties we have the innovation of a five or ten minute quiz at the end of our presentations this morning. Needless to say, I am quite uncomfortable at this point.

According to the program, I am supposed to be speaking about "Microform Applications in Classrooms." Because of an experience I had a couple of months ago, I would like to change the title of that slightly and I'll tell you why.

About two months ago I was asked to address a group of 50 librarians at a downtown hotel in Washington. I don't know how many of you have addressed 50 or more librarians; it can be a pretty frightening experience, almost as much as talking to such an esteemed group as is assembled here. I wanted to be sure to get down to the hotel on time so I arrived about 15 minutes before the scheduled presentation was to be made and decided to while away some time in a little room near the auditorium. As I was pacing back and forth a lady (obviously a librarian) walked up to me and said: "What are you doing here." I said: "I'm waiting to go in and give a speech to a group of librarians." She said: "Are you nervous?" "No," I lied, "I'm not nervous." She said: "Really? Then what are you doing in the ladies' room?"

In view of that experience, I try to make every effort to read all signs--be they on doors or titles of speeches--very carefully. With that in mind I would like to amplify the title of my presentation somewhat; I will speak briefly about "Applications of Microforms in an Academic Setting," be that in a classroom, on the campus, or off campus. Of course, much of the information that I hoped to present, particularly in the first section of my report, has already been well stated in the previous two days of this meeting, so let me try to very briefly summarize some of those points and then get into the bulk of my report which will be a description of the research project I am presently engaged in.

Classroom Applications

What are the applications of microforms in the classrooms today? I think a concensus has been generally reached that there is VERY LITTLE application of microforms in the classroom itself, primarily due to: (1) the lack of a portable reader, and (2) the lack of truly relevant microform materials (current materials, particularly textbook materials, being almost non-existent in microform).

Within the library, there is somewhat more application of microforms today. Many educational institutions are prohibited from being as heavily committed in that direction at present as they might wish because of the current expenses involved; nevertheless microforms may be found in the libraries, certainly more than in the classrooms. In the future, I think that it might well be that we will see extensive use of information retrieval, and duplication and circulation of materials by fiche or other microforms, in view of the information we have been given in the last couple of days.

Future Approaches

I certainly would envision there being a day when one could

Book Circulation Problems

walk into a library, do a quick search for information, and then go to a jukebox-type apparatus, drop in some money, and get a copy of the material desired, thus circumventing a big roadblock in libraries today: the circulation desk. Ordinarily, today, you spend a lot of time trying to find a hardcopy; if you are lucky it will be where it is supposed to be in the library, but then you go through the process of checking it out. If you are preparing for a term paper you may be carrying 15 or 20 books to a distant place on campus or to your home. You are subject to overdue fines which create bookkeeping problems for librarians who have to assess the fines and collect them; you have to return the materials to the library, eventually, or not be permitted to go through the graduation line. When the materials are returned to the library they have to be reprocessed, reshelved, and so forth. A lot of time, and a lot of space, is required; it makes sense that microforms will be used extensively in libraries to overcome some of these problems. I think that has been made rather clear in this meeting thus far.

Off-Campus Use

In terms of off-campus applications, there has not been a lot of reference to this application in the past two days. There would certainly be a need for that if you want to take the materials home. In junior colleges, in particular, there seems to be a very good potential for microform applications in this regard because there are quite a number of such schools around the country that are located in what are sometimes referred to as "mini-campuses." One example is Pasadena City College in California; at last count it was located in 41 different sites throughout that city. The potential advantages of having at least a relevant part of the library, if not the whole library, at these respective locations seem obvious; this could be done with microforms at the various locations or through some means of retrieving from a single location. Another example is a campus where students live as much as 200 to 300 miles from the school. It would be an obvious advantage for students to have their microforms and a portable reader with them to do their work; the library, in effect, could be sent to each student.

Indeed, the access to information in this form for remote locations seems to fit quite well.

Requirements for Success

To summarize overall views on this, I would say that the success of microform applications in an academic setting depends on the availability of relevant materials, portable and inexpensive viewers, appropriate indexing and cataloging systems, and adequate retrieval systems. Yet, the crux of the matter really is this: no matter how much space is saved, or how much money is saved, no matter how much retrieval time is saved or how relevant the collections are, unless people accept and utilize the materials and unless they learn from microforms as least as well as they can learn from hardcopy, no true savings will accrue. It is the UTILIZATION of microforms, and the effect of such utilization on LEARNING that we at the American Association of Junior Colleges are endeavoring to investigate. Now I would like to report briefly on our plans and procedures.

AAJC Investigation

The U.S. Office of Education granted funds to the American Association of Junior Colleges in 1969 to conduct this investigation. You might ask why such an association as ours should be interested in pursuing this kind of investigation. I think we are interested for two basic reasons. Although I was not involved in the proposal writing for this, it seems to me there are two reasons for the effort. One is the phenomenal growth rate in junior colleges, nationally. This is the fastest growing segment of education in the country at the present time. In 1960 there were 600 junior colleges; in 1970 there were 1038 junior colleges. These schools enroll 2 million students. According to the best estimates we have, by 1980 there will be from 4.5 to 12 million students. This may not sound like a very good estimate because the range is so broad but the range is explained by the fact that two things are operating: if the existing junior colleges continue to expand their programs as they have in the past decade, there will be 4 million students, but if new junior colleges continue to appear at the present rate, 200 to 500 may be constructed between now and the end of the decade. Right now a new junior

Growth of Junior Colleges

college is coming on the scene at the rate of one every five to six days. This means a whole new establishment has to be planned and financed, including a library system. For this reason, I think the Association was interested in investigating possible ways to streamline, to economize, to compact, and otherwise facilitate education at this level in particular.

A second reason in the Association's desire to serve its constituency. We should know whether or not to advise or recommend that new libraries concentrate on microform technology.

Characteristics of Junior Colleges

In terms of OE's commitment to our Association, I can't really second guess why they appropriated the funds they did for this prupose but I imagine that there are certain characteristics somewhat peculiar to junior colleges that make this kind of study quite desirable at our level of emphasis. For instance, the ages of junior college students are more diverse, generally speaking, than at any other level of education. (Elementary and secondary education is quite homogeneous; students are grouped almost entirely by age; even in the University, most of the time the students are pretty much of the same age.) In junior colleges, it is not uncommon to find students between the ages of 17 and 70. You can find a 70-year old student in a University, I know, but you can find many more of them, percentage-wise, in junior colleges. So, age is a first interesting aspect of junior college students.

Diversity

A second characteristic is academic preparation of junior college students. Junior Colleges have drop-out students that have not gone past the fourth or fifth grade in education, and also have people with academic degrees who are coming back for a refresher course. There is a great range of academic preparation. The goals of the students vary significantly, also. We have the housewife who is taking a course or two just to be studying something of interest. You have people in A.A. degree programs, such as technicians. You have transfer students who plan to go on to a 4-year college.

There are a lot of differences in goals, and there are a lot of differences in student ability. There are remedial programs and programs for accelerated students. The very heterogeneity in junior colleges may make this an appealing place for this kind of study because the findings may be more easily related to other levels of education. This may be more far-reaching, therefore, than if the study were undertaken at some other level of education.

The Initial Study

The study itself is divided into four phases. PHASE ONE began in 1969 and ended in June 1970. Ten of the most commonly offered courses in junior colleges were identified and subject specialists were hired to prepare bibliographies for each of these courses; this included required, supplementary, and recommended reading materials. This resulted in the accumulation of more than 4000 entries. Bibliographies subsequently were mailed to all junior colleges in the country. During this first phase the planning for the balance of the study was undertaken as well as the necessary staffing.

Pilot Testing

PHASE TWO began on June first of this year. It was at that point that I joined the project as did the Research Specialist. Most of June was spent in reviewing the original proposal, determining the implications of the language, what OE really wanted to find out, what our Association wanted to do with the information once it was obtained, and so forth. This year's activities center around a series of pilot studies to be conducted at four junior colleges in the Washington, D. C. area; those colleges include a technical institute, a private college, and two public Junior Colleges. In each instance, in arranging for these studies, we went through the heirarchy of each institution, starting with the president and working our way through the Dean of Students, Dean of Faculty, Director of Institutional Research, Chairman of Departments, and then the Librarians. Through this series of meetings we were able to identify innovative teachers and (more important) cooperative teachers that would be willing to participate in this kind of research study.

We thought it would be unfair to impose a set of pre-packaged materials on the teachers and on their students, so we then asked the selected teachers to supply us with their own course bibliographies. Then we began the very laborious process of obtaining copyright releases from the various publishers. Now, we are filming materials for approximately 100 students this year. To do this we have had to contact 43 publishers; we have heard from about half of them thus far and all have been favorable. We hope to have all the commitments by the end of this week. Meanwhile, the acquisitioning of materials and equipment continued, orientation programs were developed, and instruments and procedures for data collection were developed.

The study depends on these two primary variables: (A) acceptance and utilization of microform; and (B) the learning effectiveness of microform. To get at these two variables we are manipulating five variables: first is CONTENT. We are looking at the difference between an essay course and a display course. By this nomenclature we are referring to an essay course as being something like English Literature or U.S. History where the student would be manipulating or moving the fiche or film pretty constantly throughout the study period. A display course would be something like math, physics, chemistry, where a good deal of the time might be spent looking at a chart or a diagram, or working out figures, where the display is relatively constant, as compared to readings.

Essay or Display

The second independent variable is that of POLARITY. We are looking at positive and negative film; that hardly calls for an explanation except I think it is interesting to point out that in this case we arranged to supply portable readers and microfilm for a dozen or so students in an English Literature class that will be studying in Oxford, England during this Spring Semester. Maybe that seems a little like showmanship--i.e., rather over-dramatic to go all the way to Europe to do this--but it worked out as a good application because in this case the teacher was requiring 4000 pages of reading during eight weeks. A footlocker of materials

Positive or Negative

originally were to be taken along. With microforms, we packaged the materials and portable power electric motorized readers for each student.

Cine or Comic

The third independent variable is FORMAT. We are putting some materials in cine and some in comic strip. In this case, history students are involved.

Home or Library

The fourth variable is ACCESSIBILITY. Some students will have access only in the library while other students are being provided portable readers for use at home or elsewhere. Finally, the fifth independent variable is MODE. (Originally there were only two modes but my research assistant frowned on my referring to this as the co-mode.) We have four modes. We define mode as the mechanical operation of getting the microform into view. One mode is reel, and roll film; a second mode is many fiche per reference so that with a 300-page book there might be half a dozen fiche, and a student might have to keep about 56 fiche for a term's work; the third mode is one reference per fiche and to do this we are filming at 70x to 90x. The fourth mode is many references per fiche. This is providing the whole course material on one card; to do this we are filming in the 150x range for that particular mode.

Mode

Collections Study

In addition to what I have recounted, we will have an additional pilot study; it involves as much groundwork as the others combined. In this instance we will be introducing large collections of pre-packaged microform materials. We have been able to acquire packages of materials from eight micropublishers and, with proper indexing, we hope to get this material into a library and see how much use it will enjoy, with proper orientation of the student body. Pilot studies thus outlined will begin in early January. All the students will be involved by March. These pilot studies are scheduled to be concluded by June.

Loans

We have been able to acquire a good deal of hardware and software on loan to the project because, with our limited funds, we could not hope to have all companies represented.

We want to include as many as we possibly can. We have the problem of not being able to buy equipment on this particular OE budget; we can lease it, but working on less than a year's lease is almost impossible with inexpensive equipment; people just don't want to lease such equipment. So far we have about $55,000 worth of equipment and materials on loan to us, including one automatic retrieval device.

Revision

At the conclusion of the pilot studies we will then revise our research design for PHASE III. It is important to keep in mind that during the pilot studies we are not looking for conclusions; we are merely looking for INDICATORS of things that we really should concentrate on later.

Full-Scale Testing Criteria

In PHASE THREE we hope to involve (given our present budget) approximately 5000 students at a dozen junior colleges around the country. The criteria for selecting those schools are not known at this time. In great part they will follow the results of the pilot studies, but we think also we will need to take certain considerations into account, such as geography. Is there a regional difference in acceptance and utilization of microforms? We want to have at least one college in the South, one in the North, one in the Mid-West and one in the Far-West. As to population centers, is there a difference in the level of sophistication of students who live in urban centers as compared with suburban or rural areas? We want to have one college at least in each of these situations. We also must consider financial support, public and private institutions, rich and poor institutions, and cost. We have to consider curriculums, vocational, technical, comprehensive programs. Consider subjects within a curriculum. We also want to consider ethnic groups, perhaps one predominately Black, Chicano, Indian, or other minority institutions.

Analysis

Our study will be over a two-year period and the main purpose in having a two-year field test is to assess long-range effects. Then, PHASE FOUR, is planned as a phase of several months' duration for analysis and dissemination of the findings of the study.

We feel there is a lot at stake here, not only for education, but for the microform industry, because our recommendations could affect potential sales; for education, our project could have a lot to do with the emphasis on future acquisitions.

Prediction

Aside from this project, I personally feel that microforms will be used extensively in academic settings within the very near future. I think that a "point of readiness" has already been reached, at least from the viewpoint of institutions. The growth rate suggests a great deal of competition for tax dollars. It suggests a need to streamline and to economize; in so doing the point of readiness is there--anything to help save money, building space, in compacting information, in retrieving information. These things would very much be looked upon with favor, at least in the junior college segment. With regard to students, we are faced with a great information explosion (as protrayed for us in the last couple of days) and students are ready for more efficient and effective means of retrieving information. Microforms seem to be leading candidates in this category. As to the classroom, well, that is something we at the American Association of Junior Colleges are trying to find out. If there are inexpensive portable readers on the market in the near future, and if there are truly relevant materials, including current textbooks in microform, and if students not only accept and utilize microforms but learn at least as well from them as from hardcopy, then I think that the answer will be yes. Thank you.

Requirements

JAMES PREVEL

President of Educational Information Services, Inc., Washington, D.C. Mr. Prevel is involved in developing educational and library systems, working with schools, libraries, architects, hardware and software producers. Previously, he was in charge of equipment development at the U.S. Office of Education where he initiated and monitored library microform research and development programs. He was formerly Chairman of the COSATI Micromedia Sub-panel, member of the Society of Motion Picture and Television Engineers, and member of the Association of Educational Communications and Technology. He holds a degree in Engineering and Psychology with a Master's in Educational Technology.

THE MICROFORM ENVIRONMENT

Thank you very much for the opportunity of being here. My wife has come to the position at this time of saying I am such a believer in microforms that all somebody has to do is blow in my ear and I take off somewhere to talk about microforms. Originally, Don Holmes was going to be here since he was in charge of the ARL microform study, but he had a last minute commitment and unfortunately could not come. From my training I am an engineer; therefore I am more-or-less hardware oriented. Consequently, when I hear that hardware manufacturers are only out for money, that they are very cold and callous, it sort of rubs me the wrong way. There was a documented article in the Library Journal last year (I believe it was in May) which relates the story of a hardware man on the border of Texas. Unfortunately I can't identify the company so I will just have to use initials. This was an N.C.R. man; he picked up the phone and called his main office up North. He told his boss that there was a potential customer down on the Mexican border who wanted to buy a PCMI camera because he wanted to make high reduction fiche. He wanted to have a camera with this kind of capability because it seems this fellow was going into Mexico to take some kind of arty pictures and he felt that when he tried to cross back across the border again from Mexico the border guard might not

Story

let him through if they could see what he had. This company hardware man in Texas got to thinking about this and told his boss "I don't think it is right, I just don't think it is morally right to sell a man this kind of equipment for this particular purpose." His boss didn't answer at once, but after thinking it over for minute advised: "John, I believe it is going to be all right to sell him that camera. I think it is all right to sell the man this equipment as long as you wait a couple of weeks and then go down to the border guard and sell them a reader."

"Systems"

One of the problems of our society is that whenever a word comes along with a lot of meaning, with a lot of meat in it, there is a tendency for us to use that word so often that we all get to the point where we expect it to be used, and then we think of it as jargon; eventually not paying any more attention to it. I believe this is the case now with the word "systems." This word has been bandied around in "systems analysis," "systems approach," etc., so upon hearing it we have a tendency to disregard it. The word itself however signifies a valid concept. We have heard it mentioned in the past three days and I would like to spend a little time on a "systems concept." If we say that in the final analysis we are concerned with the user, asking if he really will be able to use some kind of information (whether in books or on film), and if the information really will be used, then it is going to be a function of (Figure 1) each of these sub-systems within the larger information system. Whenever any one of these parts breaks down, you will have a dissatisfied user. Carried further; when designing a system, we try to take into consideration all of the factors that should go into it. I was very surprised yesterday to hear that a large number of universities around the country are doing their own filming because I never would have expected this. Now, before they film material, what is considered, what do they think and talk about? They should really start with the considerations outlined here, because whenever any one of these points is not taken into account (there may be more to be added to this list) then the system developed will not be an optimal system, and who is going to suffer? Of course, the one to suffer for an inadequate system is the end user. What kind of parameters should one consider? Before deciding to go to fiche, roll film, cartridge, 150x or 80x, or whatever, you should begin to consider these points, and they should be answered, not in a general manner, and not because some other school is doing something in a particular way, but answered in relation to the specific needs and requirements of your own institution, because in the final analysis you know your own users and you know your own functioning library system. There are always problems, so whenever you decide to put a particular piece of information onto film, you should look squarely at these problems. Believe me, when a user sits down to use either fiche or film, it doesn't make any difference whether his dissatisfaction stems from a dirty lens, poor quality of film processing, inadequate illumination, or whatever. One of the studies mentioned yesterday by Al Veaner was one undertaken by Harold Wooster. He was with the Air Force and about two years ago approached by Colonel Ames, head of the COSATI operation, who asked Harold to do some research to determine how microfiche was accepted by users around the country; there was only one problem, no money. He said: "Harold, you will have to use your own time, and your own secretary." So, being the kind of man he is, Wooster decided to write "letters to the editor" in a number of professional library journals and magazines. He posed the problem and asked for positive and negative reactions, receiving about 350 letters from people out in the field. Of course we have to look at this particular user population to keep the results in context because there are certain kinds of people that will answer ads and letters to the editor; you would expect them to be ones that have had experience up to the chin and they are really looking for a place where they can complain. But, what did he find out from the replies he got from these users? I went through his report and assigned numbers to each of the problems that I came across; the largest number of concerned problems stemming from the fact that microfiche have not evolved as a system.

Specific Parameters

Air Force Study

They started somewhere in the library when a couple of fiche were obtained and then slowly grew and before the librarian knew what was happening, she was in over her head with this new way of presenting information. This study is available; it is a very interesting real life study so if you have a chance to read it, you should.

ARL Study

Now, getting down to this particular report of ARL. Last Wednesday I was in the office of the Association of Research Libraries and picked up my copy of the report; I thought I was going to have something nobody else had when I came to Denver. Now, everybody has it! As a member of ARL you automatically received it in the mail. It is also available on microfiche in the ERIC system, but you don't want to use any old fiche! One of the important comments is that, as Don says, we must have user acceptance, and even more than that, librarian acceptance of the format. Most of this material has been covered, but let me add a couple of things. With regard to exposure to microforms and training in their use. The library staff needs exposure in this area. I shouldn't have started this presentation with a joke because you are going to think this is the same, but it is not. In a large eastern state university with extensive microform holds, a student went into the library to use microforms. She approached the desk and asked the librarian to see some particular microform materials. The librarian's words were "Do you really want to use microforms?" The student said she did and was taken back to a reader that was dirty, so they had to wait for 10 minutes for somebody to come that knew how to clean the reader. After the material was cleaned, the student was able to read it. Here is a series of circumstances, from an actual occurrence, that says something about what is really going on. At another school, one out in the Mid-West, Don Holmes found a small library where the only place available to place a reader seemed to be on a table right in the stacks; whenever somebody sitting down using the reader was in the way of a patron wishing to go through the aisle, he had to get up and move the chair and let the patron through then come back to sit down again and continue his reading.

Acceptance and Training

Example

You may laugh, but this is going on out there. Staff training and continuing staff exposure is very important. About nine months ago I received a call at the Office of Education from a school librarian in the Mid-West. She said they were going to put microforms in their high school library and had about $18,000 to spend (but that they wanted to know what they should do). She asked what the future of microforms were expected to be and if they should use roll film or fiche. That may be a naive question to you and me but it was not so for her. It was a real life and basic question. She did not realize there are some unique materials on roll and some on fiche. We need the exposure and we need more detailed training. This report from ARL establishes guidelines.

Librarian Indoctrination

One thing that should be made clear about this report is that guidelines are given, and not specifications. Unfortunately, there is no easy cookbook method for what we are going to do in libraries with microforms. No rules saying how many square feet of space to use, the number of readers to provide the number of microforms to stock, and so forth, because we are still in a very dynamic stage in the development of microforms and in establishing their use. Perhaps in five or six years there may be something like the ALA and DAVI guides, but at least at this point in time there is no such reference around. Again, this is why I say that you, at each of your individual institutions, must analyze your own users, your own problems, your own requirements and come up with your own specific answers. The ARL report states that with the exception of lighting there is really no difference between designing a library for hardcopy and one for microforms. My contention is that when the newer kinds of readers begin to come along, even the lighting will not be a problem. With the light sources and kinds of screens resulting with third generation readers, lighting should be normal. As to generations, this is computer jargon; we have first generation, second and third generation computers. This also relates to readers because if you classify various readers on the market in this context, we can say that between the time readers began until about 1965 we had the first generation of readers. From 1965 to about 1969 we had a second generation of readers

General Guidelines Only

Equipment Generations

coming along, where manufacturers were more in tune with users. They have conducted human engineering experiments and know more about the amount of light on the screen, focus requirements, and so forth. The third generation of readers will come out in the 1970's and will be small, well-designed readers using the most advanced engineering. For example, a few weeks ago in New York City I saw a working prototype of a fiche-to-fiche duplicator, not intended for any high production work because it took about a minute for the exposure. The equipment, however, was no larger than a large book volume and it had the exposure as well as the development in the same black box. These people thought it could sell for six or seven hundred dollars. Now we should not fall into the pit when we see a prototype and expect something in six months to be on the market. It doesn't work that way. But at least this is the kind of thinking that is going on in the industry for lower cost and for equipment with greater human engineering. For the last part of the report another interpretation of the carrel concept is shown. Such a concept was mentioned by Mr. Stevens as having been developed at MIT. The University of Denver has another interpretation which you saw in the library last night. The one thing I can say about a carrel is that you aren't really able to appreciate what it adds to the user environment until you sit down and use one, because it can make microform use a different world. The reader becomes a part of you in effect, and there is no more of a black box just sitting on top of a table. Carrels have been with us for some time, of course, because there were a lot of intelligent people that went before us. There are a lot of good thoughts and good concepts that came before us. Here again, I might remind you of what Dr. Nelson said at the opening of this meeting; there must be a point of readiness for anything to be utilized. The ARL report is a consolidation of the work of half a dozen people on the advisory panel as well as Don Holmes. This is their expression. All the points covered are valid points which have been determined because a man ventured into the field stopping at libraries talking to people in real life situations. Not to belabor a point, the real key to proper utilization is going to be an early, accurate, and

Fiche Duplicators

Carrels

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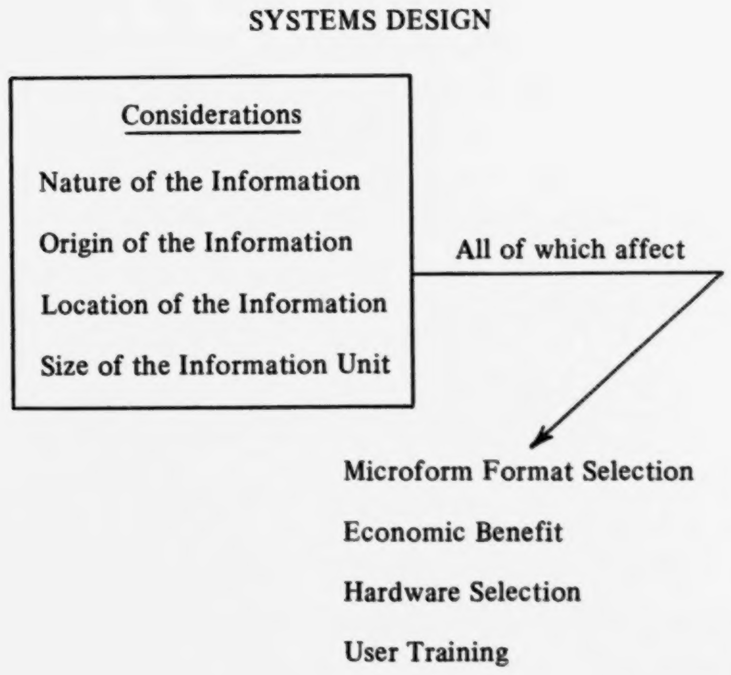
objective appraisal of the suitability of your own system. There are many consultants, lots of manufacturers, and you should avail yourself of their services; you should feel free to pick up a telephone and get information. People will help and if a phone call can get you going you should really take advantage of it. Finally, I want to mention this article in the Library Journal of November 15, 1970, called "Librarian Stereotypes versus American Motors." The crux of this is American Motors placing a full-page ad in Esquire Magazine to advertise their new sports car with a high-performance package. The ad said "This will enable you to intimidate your friends and/or competitors. We may lose a few librarians for customers, but we think we will gain a few of the purists." This is talking about the librarian stereotype. More and more we are going to find that such stereotype images are vanishing. When I go to my son's junior high school PTA meeting, the kind of teachers I see there are not the kind of stereotype teachers that I had. These new teachers are swingers. When I go to ALA meetings, the kind of librarians I see are not the kind with the buns on their heads anymore. There is no reason for us to live with this kind of image. The sooner we get away from any kind of narrowness and use all of the information media that are around, the sooner the user will accept the materials available in all their forms. Thank you.

Seek Advise


SYSTEMS DESIGN
Considerations
Nature of the Information
Origin of the Information
Location of the Information
Size of the Information Unit
All of which affect
Microform Format Selection
Economic Benefit
Hardware Selection
User Training

Prevel - Figure 1. Elements of Microform Systems Design.

GORDON H. WRIGHT

Director of the College Bibliocentre in Toronto, Canada, and responsible for the development of the organization at the Central Information and Retrieval Unit for all colleges of the Applied Arts and Technology in Ontario Province. From 1956, Mr. Wright was County Technical Librarian for the Hartfordshire County Council and was responsible for technical information and library service for industry throughout the County. The advantages of in-plant reprographic facilities and the potential of microforms and systems of information retrieval led him to develop courses, symposia, and laboratory investigations in this area. His activities led to a government grant in 1965 to supervise a 20-month investigation into microform systems. This subsequently led to a further grant to establish the now significant United Kingdom National Reprographic Centre for documentation, in 1967. He played a major role in the formation of the Microfilm Association of Great Britain, being the first Chairman, and also in the affairs of the Institute of Reprographic Technology. He has edited a book and lectured on the subject, has produced a number of articles on reprographic techniques.

EFFECTIVE READER DESIGN

I am trying to determine why I was switched to third place from my original position as last on this program. When I started off this morning, I said that the one advantage of coming at the end would be that I would have absolutely nothing left to say; then I heard that I was to be third instead of fourth this morning!

Continuity while Planning

Thinking of some of the comments that have been made, I realize our difficulties stem from our being involved in the "here and now" whilst projecting ourselves "into the future". I have been listening to the deliberations of the past two days, and I must admit that the "here and now" seems to be remarkably similar to the "here and now" of 1957, when I first became involved in microrecording. Even then, I was only following in the footsteps of many others who had been equally concerned about the POSSIBILITY of microrecording techniques in the world of library information storage and retrieval. If I could say why I believe in it, I might do so through one particular example that affects myself. Just before I left England, it was suggested I should write the history of the Hertis, but to do so would mean consulting all the documentation that was in the files in Hartfordshire. Under these circumstances, I brought over in my personal belongings, 10,000 documents on film, all the relevant documentation that I felt I would have to consult in some way or another if I was to accomplish this task.

Initial Interest

Whilst I had obviously been aware of microforms before 1957, it was not until I was involved in planning Hertis, a technical information and library service for Further Education establishments and industry in Hartfordshire, that I become convinced that microrecording was essential to information services. At that time, I believed the failure to exploit the media was mainly the fault of librarians. So, in the initial stages of my interest, I organized various symposia to stimulate awareness of the media and to encourage the manufacturer and publisher to display their wares and indicate the potential of the services they provided to the library and information unit.

Active Use Ignored

I was soon disillusioned, not merely by my colleagues, but by manufacturers and publishers alike. Whilst I was looking for a convenient, compact, storage device to facilitate fast retrieval of information for problem solving, I had the impression that the manufacturer was more concerned with selling his equipment than with how or where it could be used; that the publishers had found an economic method of publishing information but had left the problem of how it could be read and absorbed to the user. "File and forget" seemed the order of the day. Meanwhile, librarians generally felt it was an expensive gimmick, or others, like myself, whilst eager to exploit the media, were not technically competent to specify the standards for the equipment they needed.

Looking back, I can still recall my own amazement at a manufacturer producing micro-opaques who told me that he didn't see the point in designing readers and reader-printers until a demand was voiced; at an engineer reading an important report on a micro-opaque who found that he had to scan a vital table sideways to his vision because the only reader which the publisher provided did not have image rotation, and all the publisher could say in reply was that it wasn't worth it for the few frames that were involved in any reports he filmed! Or the librarians who complained no one used microforms--when the readers they provided were never maintained, rarely ready for use, and frequently in a cranny of the library which the librarian considered could not be used for any other purpose.

Scope of Centre

As you are considering the formation of a Microfilm Centre, it might be of interest to explain why we changed our original concept from that of a Microfilm Centre to the more broadly based Reprographic Centre for documentation. We felt that as microrecording techniques needed to utilize other forms of reprography, it was more useful to embrace all techniques in one Centre. It was also agreed that as manufacturers saw the library and information world as a very small market, it was necessary to embrace all forms of information retrieval for business, industry, and the public sector if we were to achieve maximum results.

The National Reprographic Centre for documentation had six major objectives:

Objectives

1. to collect, evaluate, abstract, index, disseminate and interpret for users, published information associated with the subject. This formed a practical experiment in a microbased information service. (The desk-top micro-library.)

2. to maintain liaison with appropriate organizations in the United Kingdom and abroad.

3. to sponsor courses, lectures and symposia to aid a fuller understanding of these techniques.

4. to study equipment in operation in various environments, including the testing and evaluation of equipment in controlled conditions.

5. to coordinate with other specialists studying specific user information and data retrieval requirements. Particular attention to be given to the study of problems affecting readability and print-out.

6. where research or development is necessary, to seek further grants to sponsor such work in appropriate organizations.

All Parties Considered

Obviously, all of these objectives are closely related. However, in their interpretation, the Centre wished to become involved not merely in specifying user needs but in understanding any problems faced by manufacturers in meeting these needs. For this reason, the evaluation program, whilst completely independent, was nevertheless pursued in full consultation with the manufacturer. We were anxious to discover what had motivated the design.

"Reading" Device Required

The result of this exercise was often startling both to the Centre and designer alike. In some instance, the equipment had been produced as a development of optical equipment and, in so doing, the designer had been influenced by the concept of it being a laboratory tool, to be used as a source of reference at a bench. Not an incorrect assumption if its use is for reference rather than as a reading device--but is this the case? In other instances, it became very clear that the designer was either not competent in the optical issues involved or had insufficient knowledge of newer production techniques which could have assisted him in keeping costs low. Too often, it appeared to us that quick returns were expected for minimal outlay. Certainly, we formed the impression that too many designers had not been briefed to appreciate the significant role of the "reader" in the communications network.

However, if there were problems arising from the design brief, there were an equal number of surprises in store for us in trying to establish evaluation criteria.

Test Procedures

Legibility was obviously all important and we assumed that the Draft I.S.O. Recommendation No. 648 "Legibility Tests, description and use of the I.S.O. Micromire for checking and reading apparatus" would prove significant. In fact, it led us into a detailed analysis of the test object and finally into advising I.S.O. on a complete modification of their proposals.

The Draft I.S.O. Recommendation No. 1056 "Measurement of the screen luminance of microfilm readers" was also found to contain anomolies and, until they could be resolved, we produced our own procedures. Similarly, film temperature tests led us into considering the value of the permitted ranges quite apart from the required test procedures.

As our investigation proceeded, we endeavoured to specify the basic requirements for a microfiche reader to achieve optimum utilization.

Reader Requirements

We decided that these basic requirements were: low costs; minimum time and effort to prepare for use, operate, and maintain; optimum image presentation for maximum reading comfort; minimum space occupied for a given projected information area. Thus:

1. it must be easy to insert or remove the fiche or film without damaging it, and to rapidly locate onto the screen any of the frames on any of a range of possible formats and, if necessary, to rotate any image to achieve right reading;

2. the image on the screen must be adequately legible (i.e., of adequate size, resolution, and contrast) under all likely ambient lighting conditions; the surface of the screen should preferably be normal to the sight line of the average seated user; eye strain with prolonged use should be minimal;

3. all controls must be readily accessible and visible to the user, and require minimum effort, mental and physical, to operate;

4. the reader must occupy minimum space, particularly minimum desk-top area, but must be adequately stable on the desk-top;

5. if portable, it must be easy to fold, or unfold, self-contained, robust, and easy to carry;

6. it must conform with relevant safety standards;

7. performance on a microfiche or microfilm reader must not be compromised by attempts at versatility, in particular by accommodating other microforms;

8. form, colour, surface textures and finishes must be compatible with foreseeable working environments;

9. servicing facilities must be available.

If we examine these criteria more closely, perhaps, we can see some of the reasons why equipment is generally unsuited to our needs.

The Materials

It is worth noting that their failing in the communications network may have originated in the filming stage even before we load the unit. Have we followed the format of the book too closely? Is Harold Wooster correct in suggesting that on a fiche we should start at the end and then reverse our filming along each row so that easier movement follows a logical progression through the document?

Has the publisher always supplied an index on the contents page at the commencement of the row? In loading fiche, how do you tell which way to insert--try putting a fiche in the same way in several readers and see the results!

Handling Facility

Ergonomic principles are rarely applied by designers. For example: with some readers coordinated movements of both hands are required to transfer a fiche (filed with the eye-legible title uppermost and reading left-to-right) into the carrier with the title downwards, reading right-to-left, having removed the protective envelope and leaving the left hand finally free to operate the rocker button, while the right hand inserts the fiche.

The microfiche carrier is in itself a simple mechanism but what kind of force is required to move it? Is it smooth or does it require a force at the outset which then makes it travel past the frame you need. The German Post Office specified a force not to exceed 200 grams. In eight readers we measured only one came within this figure. The majority required a force of 2 pounds and one a force of 4 pounds.

As for roll film loading, we can only look with relief at the cartridge loading system. Previously, threading roll film defied any user convenience--especially when the film had to be twisted at right angles to itself!

Image rotation is essential.

Conformation to Humans

Legibility factors may be influenced by environment but, also, the position of the head and seating arrangement are all contributory factors in the ability to absorb information. The fault is not always in reader design but in the construction of the table. A typist does not type at normal desk height--special low tables are necessary for maximum output--so why have we never considered this factor?

Eye and Head Movements

In viewing, the screen angle should be 90° to the sight line of the average seated user. Magnification should be to the same size as the original, and viewing distances varying from 33 to 45 cm. need careful consideration. Eye and head movements in scanning between screen and a sheet of notepaper resting on the desk top are usually less for front than for rear projection readers, since the screen angle is never to the horizontal and wearers of bifocal spectacles find the head posture more relaxed. It is because of this that the average user of rear projection readers find it easier to consult the bottom of the image area. In fact, rear projection readers require the eye to view at anything from 45° at the top to 85° at the bottom of the screen; hardly an attractive viewing posture.

Illumination

Illumination and screen texture require very careful study--so does the life of the bulb. A large wattage does not always provide good screen luminance. For example, one reader using a 50-watt bulb provides 161 foot lamberts at the centre and 11.6 at the corners, whilst another with a 400-watt bulb provides 103 at the centre and 8.4 at the corners. If we compare these same readers for resolution (remembering that the average human eye can resolve 6 to 7 lines per mm.) we find that the 50-watt system resolves 8.7 and 5.3 whilst the 400-watt reader gives 6.3 and 4.0 lines per mm. In neither instance was a hot spot noticeable due to inadequate diffusion.

On the other hand, the life of a 50-watt lamp may be about 50 hours compared with 600 hours for a 100-watt lamp, so the initial outlay on a 100-watt lamp may be cheaper in the long run.

Heat dissipation was not always effective and in some instances could actually damage the film. Once again standards varied--the British and International standards are considerably lower than the U.S.A.

Controls

Controls were invariably a matter of concern. I always thought Kodak was the worst offender but soon discovered that they are not alone in creating impediments to ease in operation. Focusing controls, in particular, are generally bad so that often when the fingers are relaxed from the control the focus is immediately lost.

Failure to meet anything like an acceptable desk-top space is possibly due to the fact that little objective study has been carried out on usage in the user environment. Rarely does a user consult one item at a time, and frequently he needs to make notes. How does he manage when the reader requires 3 square feet or more of desk space; 0.6 square feet is a far better module to assume. However, it is equally important in a small space to ensure stability. A Yugoslavian reader, for example, only required a force of .49 ft. lbs. and a tilt of 15° before toppling on its side.

Perhaps the least said the better--but there are signs of improvement in portability.

Safety

Safety seems more important to the U.K. than in North America but we found many serious errors in design which manufacturers had to modify before they could be acceptable. But, if you want a commentary on the problems of standardization, take a look at colour codes for wiring:

COUNTRY	LIVE	NEUTRAL	EARTH
East Germany	Black	White	Red
U.K	Red	Black	Green
U.S.A.	Black	White	Green
International	Brown	Light Blue	Green

Versatility Compromises

In our view, versatility to increase the potential market or to meet all needs of one user has been the cause of many poor designs. We should forget it for the present.

Looking back, then, what do I consider the NRCd has achieved. It has provided designers with a source of reference. I know that it has influenced design and, in some instances, has stopped thoroughly bad readers from being introduced onto the market--in one case after the manufacturer had already announced the reader. So it is untrue to say that informed users cannot influence the market.

User Influence

However, even more significant has been the willingness of members (and non-members) to approach the Centre with their system problems and concepts. This has provided the staff with an opportunity to participate in a range of projects associated with microbased systems to meet a variety of applications. In turn, this has helped to create new market potentials for the manufacturers.

Centre as Model

As the organisation is user orientated and, though National, it is international in concept, it has become an international focal point providing a model for other countries to consider and possibly emulate. Certainly, it was my hope that similar National Organisations would be created in other countries so that there would be more useful interchange of ideas. Above all, a greater influence from informed clientele has been brought to the problems of standardisation. That is why I am delighted to hear that the U.S. is considering the formation of a Microfilm Centre.

JAMES P. KOTTENSTETTE

Mr. Kottenstette is a Research Engineer with the Denver Research Institute, University of Denver. He received his M. S. in Mechanical Engineering in 1963, and M. B. A. in Business Administration in 1968. His interest in microforms began several years ago when a study for the U. S. Office of Education was funded at the University of Denver to examine applications of ultrafiche in higher education. The study resulted in a human factor investigation focused on individual user behavior associated with machine use. He is presently the President of the Rocky Mountain Chapter of the National Microfilm Association, and member of several societies including the Sigma Xi and the American Society for Information Science.

USER BEHAVIOR: REQUIREMENTS

Thank you, Dave. It is a pleasure to stand after that kind of an introduction! I'll tell you the real reason I made the change in presentation order this morning; I hope to introduce a little different format during my talk. I want to start an argument.

Aid to Reader Development

Yesterday Carl Nelson asked "Is there some kind of a reader recommendation we can develop through this conference activity?" This question was in the context of reader development to supply what the library actually needs; the propounding of a statement of what the library wants. This question was reinforced a few minutes ago by Warren Boes. I would like to address myself to that subject this morning. The easiest way to bring it into focus so that we might deal with it as an issue, is to recall Francis Spreitzer's statement that there is now available a fine piece of reader equipment, a reader-carrel particularly designed to display newspapers. We should recognize that this particular piece of equipment was designed to do a very particular job. Please recall that it has a hole in the middle where the projection is brought through the work surface, and this is not inconsistent with the particular kind of information displayed (the newspaper). The fact that there is a missing element, perhaps one-hundredth of the

Specific Console

of the presentation area, is no problem. The point I would make is that this equipment would be entirely inappropriate if we were talking about a display area for a book that might be four inches across and six inches high, instead of a newspaper.

Research for Implementation

I would like to reinforce the idea that we are in a position, now, to take the comments of Gordon Wright and develop them; Gordon said you should have specific equipment for a particular microform, and maximize utility consistent with that form (from the individual user's point of view). The newspaper carrel came on the market three or four years ago, and probably was in somebody's mind 10 or 15 years ago. The lack of awareness about this equipment is almost consistent with its specialized use. In a sense, it is ahead of its time. What has happened in the last few years (through research) is an attempt to discover what we really need in specific equipment when we talk about implementing the different information forms encountered in a library. Should an administrator put funds into integrated carrels that must be quite different from one another for the different microforms that they are designed to handle? Those of you who dropped into our library last evening saw a particular interpretation of an integrated carrel developed for the ERIC materials.

User Tasks

What is the value of an integrated carrel? One of the reasons there has been confusion in how to approach the total problem of user needs within a library is the fact that there has been no attention given to the different kinds of tasks that engage the user. I now want to define two tasks; you can develop your own adjectives to define the human activity I am going to describe. On the one hand, there are microform materials developed for what I call "study" tasks. The user transaction taking place in a "study" task is highly cognitive; there is a great deal of abstraction taking place on the part of the user, and his encounter with the microform material can extend over a considerable period (an hour or two, perhaps). This time interval is characteristic of a "study mode." On the other hand, there is an activity in the library which is of the "reference" type. It is a use mode in which an individual finds specific information, maybe a citation, a relevant paragraph, or an abstract. The transaction is characteristically short-lived. It can be completed rather quickly as compared with the "study" task. The important thing to understand about these two use modes is that when an individual is operating in the "reference mode" he is highly motivated. He knows just what it is he is after, or he thinks that he does, and when he recognizes the information that will satisfy his need, he is finished. There is an immediate reward to the user. Contrast this situation with the "study mode," where the individual does not receive immediate reinforcement. In the "study mode" the individual works with the filmed material in a way similar to his use of a textbook; he has some idea of how far he wants to pursue a subject but has no real measure of when he has done enough. There is no actual, well-defined goal with each separate transaction. He may get his payoff weeks in the future when he takes his exam.

Degree of Motivation

Of course, library uses extend across the entire spectrum of transactions with "study" on one end and "reference" on the other end; the key is that "reference"-type uses dominate in the library. In differentiating these two different kinds of activities, "study" and "reference," I am suggesting that the library adopt the integrated carrel concept in support of "reference" transactions. I hope that we can develop a recommendation in this respect.

Library Stresses Reference

I want to tell you about some of the research experiences we have had here in Denver. (Figure 1). This is an experimental carrel configuration which we developed with very specific objectives in mind. We thought it might be useful to essentially "hide" the reader, and in the process of hiding the reader we would try to integrate it into an overall work station (consistent with the requirements as we understood them at that time.) However, we did not yet understand the difference between "study" and "reference" tasks. Notice that the reader on the left side can be moved around on that work surface. The carrel is a very standard design in terms

Carrel Experiments

of the human factors involved. What we illustrate here is that there is a complex relationship between the use of supporting materials on the work surface and the display that exists on the screen. One thing that you may notice is that the screen and the work surface are spacially separated to a considerable degree. On a free-standing work surface the user can make adjustments; he can move the reader back, or to the side if there is enough room. This particular design does not allow the full range of flexibility that might be encountered if a table were used, but the characteristic of disorientation between screen and work surface is obvious. Now, on the other side of the carrel (Figure 2), we were attempting to form an integration of the work surface and the reader, so that the user could focus the image, position the fiche as appropriate, and use the work area with minimum head movement. The spacial separation is minimized; with a small tip of the head the eyes drop from the screen to the work surface. We designed the work area so that it actually included the front surface extension of the reader in order to establish the best positional relationship.

Two Designs

This slide (Figure 2) illustrates that you can design an arrangement of reader and work space that makes the reference task most simple; this arrangement works well over a short period of time where the individual tends to know what infomation he is after. We thought that the integrated carrel would be preferred generally, but when we went into a testing phase, we began to understand that there is a great difference in tasks; something very different happens when the user changes from one kind of transaction to another. We executed a series of student user experiments utilizing both of these readers. When we had tasks that were structured, where the user had to complete certain readings and answer specific questions, then without qualification, he preferred the integrated work carrel. However, toward the close of the test session with each individual, the subject was directed to only read a series of articles comprised of topical materials. The subjects were cycled from the integrated carrel to the free-standing reader. For this work, the free-standing reader was preferred because of

Different Use Modes

greater comfort. This comes back to the idea I have been emphasizing; we need to design based on the kind of transactions we want to facilitate. The non-integrated arrangement permitted the user to turn about and swivel in his chair, pull the reader after him if he wished; you would witness a variety of behavior whereby the user establishes an accommodation. Where the reader is built in, this accommodation is largely obviated, by design. The student had to attack the work in the reference mode and in doing so there was a particular configuration that was appropriate. There are really two kinds of readers that we are discussing.

Permanent Library Equipment

We've heard comments on the lap or portable reader, and we all understand that this is in the process of evolution and that there will be more such instruments. But, within the library, there is a need for permanent equipment development, a permanent embodiment. We hope to see the portable reader well developed in time so that it will achieve the flexibility and comfort so necessary to the "study" mode. However, there is a role for the reader in the library that relates to the highly motivated user requirements of the "reference" mode. I think there is a clear role for the integrated carrel in the library which is primarily reference oriented, in contrast with readers for study which may better utilize a more flexible design approach. When we talk about the microform information system operating in the library, we should be trying to design a highly effective arrangement of equipment (which I believe to be an integrated carrel concept in the library environment) because we are trying to facilitate the reference-type of transaction where a person knows what he is after. For the situation which is study oriented, the flexibility of the portable reader can have very different kinds of embodiments.

Highly Portable "Study" Reader

You can satisfy the user in the reference activity by planning for it; just look at the ERIC collection and the way it is used. It is a reference collection that, in general, can be facilitated. When we leave the reference material framework and consider collections that will be perused for extensive reading or for pleasure, we should leave the fixed design concept and create equipment in which reader portability and flexibility are featured. There are two ways to go; I believe the integrated carrel is the most appropriate for the library at this time because of the reference nature of the library materials. The flexible, portable, small equipment will be necessary when we actually have microform materials supporting the "study" mode as opposed to the reference mode.

Materials for "Study"

Let us take a closer look at the "study mode" in order to better see the design implications. In our experiments, we were very much concerned with the idea that routine use, as seen from an administrative point of view, might be something quite different from routine use as seen from an individual's point of view. To exploit our opportunity under Office of Education funding, we tried to construct a situation in which we might observe routine study use of microform materials (individuals encountering materials of value on a routine basis, two or three times a week, for an hour or more at a time). We had to ask if it might be possible to make an information unit of such value to an individual that it would of itself supply his motivation to use it. We had to deal with some very important limitations here. We could not retire the hardcopy resources needed in a course just to switch students onto a microform system for a research experiment. Therefore, we thought that the only way we could generate a basic motivation for students to use the microform routinely was to provide something extra, such as all the material gathered into a single unit. (We didn't want to pay students to try this or to have any kind of artificial motivation.)

Routine Academic Use

We implemented two systems in these experiments on routine use. (Figure 3) One system used a film strip as you see here. Actually, the entire package was made up of six of these strips, and were products of the Microform Data Systems Company. This material supported a survey-type graduate course in the field of information science. That is, the students involved in this course were expected to be familiar with the general developments of authorities in the field. Some 40 different resources were filmed,

Course Materials Availability

including 17 complete volumes; about 80% of the individual titles occurred in part in a syllabus. In a second course, we used reading equipment and the technology of the NCR Corporation (Figure 4). In designing this second information unit, we had much less requirement for absolute resources, because it was a content course. We ended up with about 1400 pages of information from 13 different sources, chapters taken from a wide range of basic authors in the field of sensation and perception. In this case, each student (we started with a class of 54) was given the film chip but he was required to come to the University of Denver Library to be able to use it. In the first course, with the graduate students, we made readers available to students in their own residences. At this point, I could take exception to what Allen Veaner said yesterday when he suggested that anyone would be out of his mind to use a microform presentation when hardcopy was immediately available. In the construct of both of these experiments, the hardcopy was available on the same basis as it had been traditionally in support of these courses, just across the hall from the microform reading room, on reserve, for use by students in the library. We were competing directly with the hardcopy, but the students had all the material in hand on one chip (or several in a package). The important thing to understand, and I am really expanding on what Allen said, is that you can put some things on film in such a way that the student will then actually use this form in preference to hardcopy.

Equipment Accessibility

Microform Added Value

This NCR microfiche will hold some 3200 frames the way it is set up, and we organized the information vertically. (We never did understand, as a result of our first year's work, why information was presented in a comic strip mode; when vertical, an individual can advance the film as if it were in a roll and not lose eye contact with the information. If you move sideways you always lose contact with the information.) The first row of this fiche was reserved as a continuous index, repeated all the way across the fiche, so that all an individual had to do was put the film into the reader and he could immediately tell where he was

Vertical Format

and what was available in other columns. I will not report the details of these studies at this time, because the subject at hand is reader design. Suffice it to say that the results were quite positive.

Here you see a young lady that was taking the course in undergraduate psychology. (Figure 5). She had been working for a little over an hour when we intruded on her to take this picture (what you see is not any kind of posturing). The picture illustrates two things of great importance. First, her face is about 30 inches from the screen. We encountered this over and over again; the distance between the screen and an individual's face would run from 28 to as much as 40 inches. Sometimes the user would be so far away that he would have to reach up to advance the frame. This student is not "attaching" the information, but rather she is accommodating to the display. It became clear that these students were trying to establish an illumination balance (as we heard so nicely developed by Bob Morgan yesterday). It has to do with a balance between the illumination of the reader presentation itself and the surround. In this particular case, there were lights on in the room itself, and she was accommodating to the differential. Secondly, we found that we had an inappropriate work space. We had designed the experiment initially so that there were both right and left-hand situations, and work space associated with them. Often, you would see an individual sit down in a chair, put his feet up so as to minimize the angle between the screen and his notepad, and then start to work. The whole point here is that I am describing complex transactions, which require a basic redesign of the equipment to achieve comfort and function.

User
Accommodation

Basic
Redesign
Needed

I don't think that a reader-carrel design, for those "study" activities that I have briefly described, is appropriate; this mode should be supported by a portable reader. When we consider the kinds of designs that facilitate the study mode, which is the unstructured mode, I think that is beyond the scope of the problem you should deal with at this time. Facilitating reference work is the problem, and I recommend

Integrated Designs for Libraries

very strongly that we meet this problem through integrated reader-carrel designs. I believe that this is the recommendation to give to industry. The manufacturer should provide equipment for library use that integrates the reader into a work surface so that a high degree of control over the local environment can be achieved, where a work area is provided that is conducive to the task itself. Equipment designed for a specific microform should be the aim of each integrated design so that the job is done simply. You cannot achieve an integration of the reader merely by placing it on a table.

In concluding, I would like to have you consider that it may be of major significance to recommend an integrated carrel approach for microforms in libraries. I believe that such a recomendation on the part of library administrators would be a major step forward in facilitating use of these materials within academic libraries.

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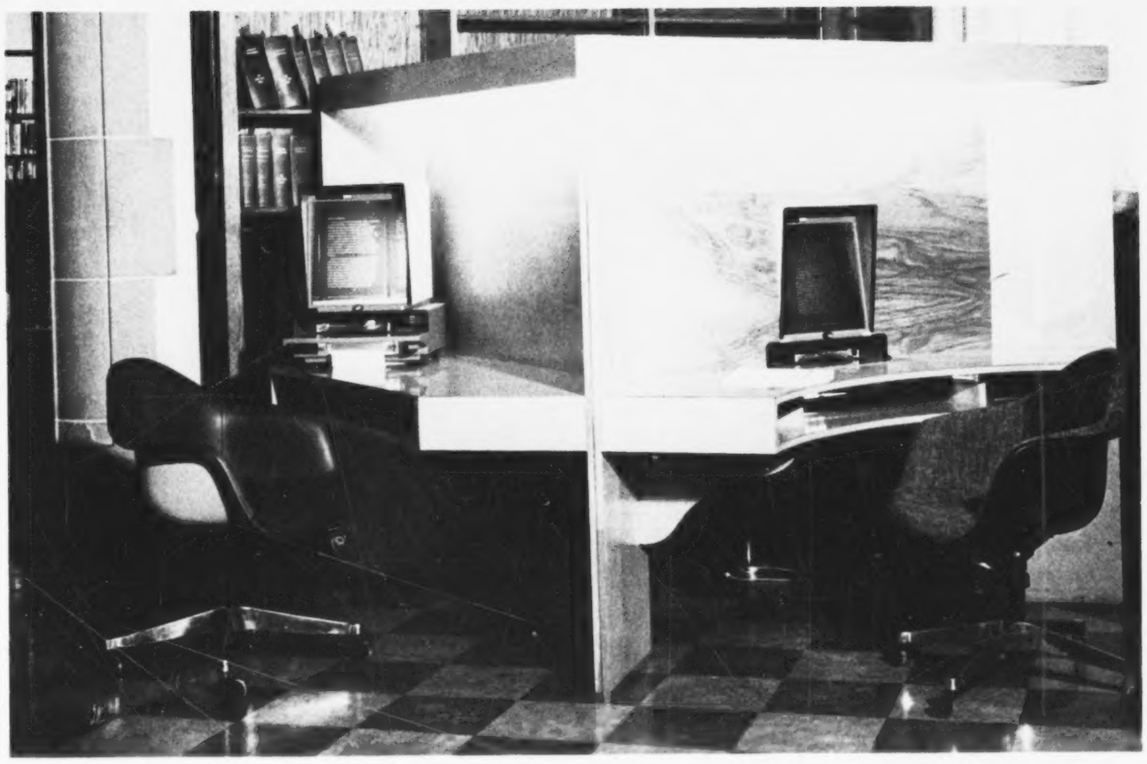
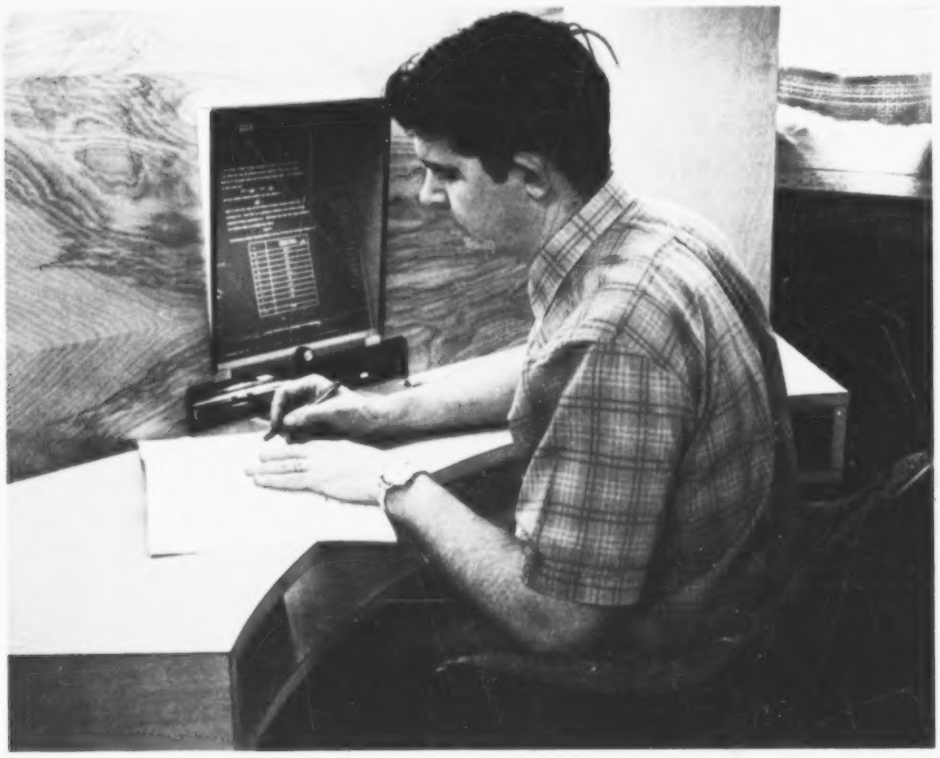
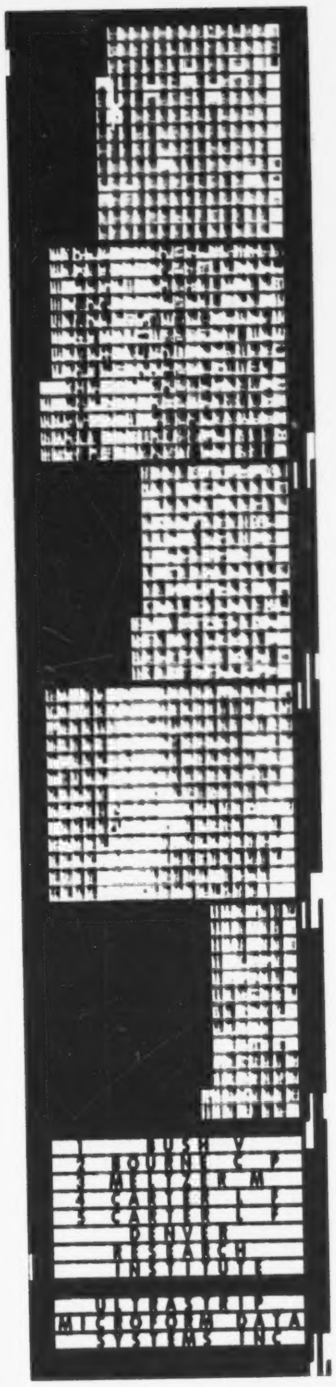


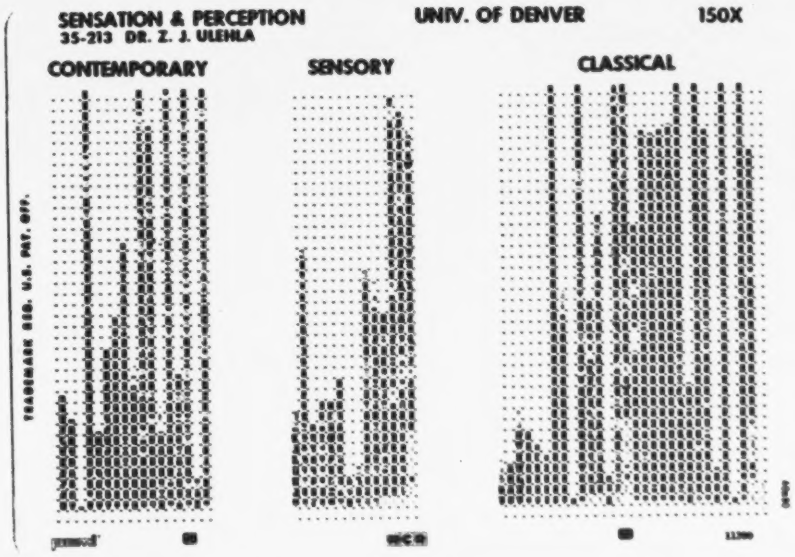
Kottenstette - Figure 1. Experimental carrel design.



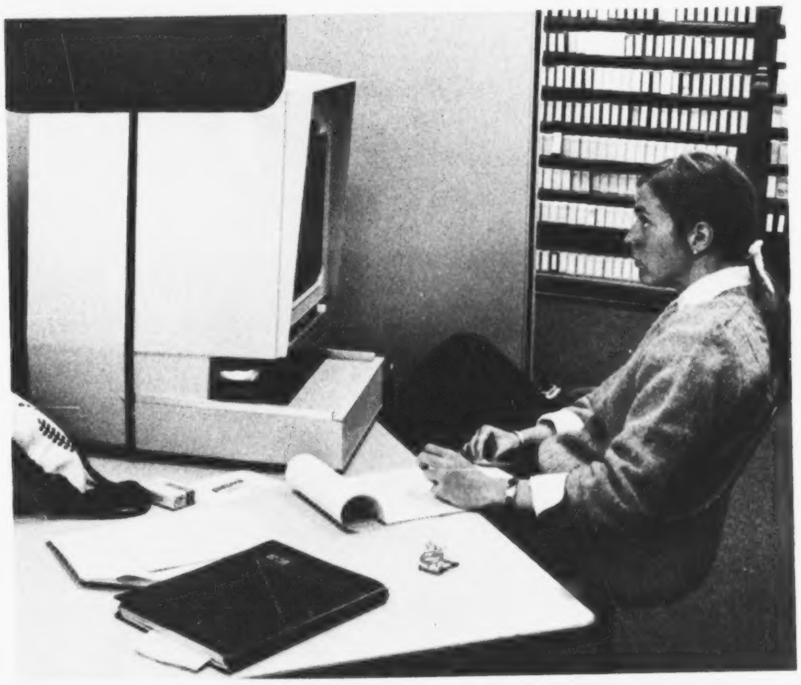
Kottenstette - Figure 2. Integrated reader and work surface.



Kottenstette - Figure 3. Film strip used in a "Survey" course.



Kottenstette - Figure 4. Example of Information Unit used in "Content" course.



Kottenstette - Figure 5. Student use of reader in "Study" mode: poorly adapted.

III. CONFERENCE DELIBERATIONS REGARDING MICROFORMS

Statement

The following synopsis is a distillation of the problems that academic libraries face in meeting the challenges of incorporating microforms into their on-going library systems, as stated by conference participants, together with their stated concerns, comments, related experiences, suggestions for solutions, and some of their immediate and future expectations. In some instances, strong opinions were expressed, positively and negatively, as to positions which should be taken by librarians to expedite the evolutionary processes leading to increased user satisfaction, and greater facility in making use of materials provided to patrons by way of microforms.

Careful analysis revealed that during their deliberations the conferees pursued three major themes to answer basic questions:

A. What is the library's changing role in communications--and the effect of change?

B. What microform-related technology is currently available for patrons of academic libraries--and what can be expected in the near future?

C. What library operations are affected by purchasing of microforms--and how can microforms be integrated into total library operations?

All of these areas are inter-related; however, to lend organization to this section of this report, the above breakdown is used to develop some continuity for the ideas expressed.

While this report by no means attempts a verbatim recital of the conference discussions, much of the original language is retained to accurately represent points of view expressed. Significant questions for which answers are needed have been stated at the beginning of each of the three parts of this section. Some of these questions were discussed at length and appeared to be uppermost in minds of the participants; other questions were posed but set aside temporarily, and time did not permit significant discussion of many of them at this meeting. A number of participants offered post-conference comments on problems particularly relevant to their own thinking, and excerpts from such comments are included here as "additional comments."

* * * * * * *

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A. WHAT IS THE LIBRARY'S CHANGING ROLE IN COMMUNICATIONS--AND THE EFFECT OF CHANGE?

QUESTIONS NEEDING ANSWERS:

How much of a library budget should be earmarked for microforms?

Where do microforms fit in planning new physical facilities for libraries?

Why are libraries used less now than formerly in relation to populations?

How can libraries regain financial support to achieve modern services?

Should libraries take the initiative in providing new media so that standards may develop through use?

Should academic libraries provide filming services for classroom support?

What is the library's position on the copyright problem as regards microforms?

COMMENTS

At the present time we see the extensive presence of microforms, but we do not see any extensive use of microforms in the academic community. It is expected that this will change. Libraries are in the communications business, of course, and concerned with messages of various length and duration: Instantaneous messages are those where a patron talks with a librarian to acquire information, and the librarian is a switching center, so to speak. Short-term messages are those in catalogs and indexes, and these are being constantly updated. The long-term messages in the library are the collection itself: hardcopy, films, maps, and-so-on. It would be expected that the instantaneous messages would stay with us because of the continuing reference needs of patrons. The short-term messages are really used to manage the long-term messages and will be handled by computer in the near future, according

Libraries: Message Centers

Aligning Techniques

to many people. The long-term messages will turn to microforms to a large extent because of the economics of printing, the cost of storing materials, and the use of machines to process and retrieve data. "Records" of all kinds will be converted to film. There may be academic packages dispensed from vending machines but it was considered doubtful that this would happen in research libraries; it was considered possible for high schools and junior colleges. COM technology will replace much hardcopy coming from computers. Problems concern interfacing many kinds of technology now available but which were not designed to be used in concert; these will be properly mated in the future.

Books by Computer

Some administrators question the extent to which microforms will be utilized as a publishing medium; others contend that more and more of the information to be assembled and used will be in microform. It was stated that many books are now being prepared by computer. This permits parallel production of microform along with conventional printing of paper copies and makes use of microform attractive.

Video Tape

The question of communications via video tape was raised; it was postulated that this held better possibilities than microform for the future in that it is easier to transmit. It was suggested that in the next few years, freeze-framing of video tape would be available. This technique was felt to be important, but not for the immediate future because it would take a long time for it to reach a product stage. For the present, information must be handled in an economical way and microform appears now to be the most suitable to accomplish the task of conveying and storing vast amounts of information. For the future, this may change but for the present there will be microform improvements and use insofar as experts can predict. Growth of the microform industry has been plotted at $5 million for 1960, $50 for 1970, and $500 million for 1980.

The cost of books and the buildings to house books make it necessary to look to another medium for the volume of data

Books? for How Long

being used. It was believed that books would continue to be primary for the next generation at least. A study by Educational Facilities Laboratory concluded that for the next generation books would dominate as the principal storage medium for large classes of data in the library. But, it is difficult for libraries to raise the large sums of money to build facilities to house continuing publications. The technology is changing rapidly--there may be optical techniques to store data. It is difficult to look ahead more than a few years. Computer costs have been greatly reduced in the past five years and can be used more effectively.

There seem to be more books being read and more books being purchased now than ever before; people buy books and read them at home. This affects libraries in that libraries once full of people are no longer called upon for the same kind of service; patrons now use libraries for resource materials or scarce materials and buy many more of their own books.

The "Right" Package

Book, or microform, it is all packaging information and that is what the library is concerned with. Some kinds of information can be packaged better in one form than in another. Imaginative literature, plays, and poetry, are an entirely different kind of information than statistical data or scientific or technical data. All forms are going to continue to exist. Our only question is the most economical method of packaging information that men and women use. Books and microforms will exist side by side for a long time.

Building Costs

Several large chemical firms have approval to spend reserve building funds for microform collections because of the cost of buildings and the expense of having books.

Book Deterioration

Today's books are not on permanent paper. We are witnessing the steady destruction of book materials at a fast rate because they are produced to last only a short time. This will be a factor in forcing libraries to develop collections in microform.

Other Sources

There are factors other than library activities and microform technology that will have an effect on use of libraries and how they grow. Plans are being made to take care of the growth and use of materials in other ways than in our libraries and this will influence the kind of collections that should be developed within academic institutions. There will be materials and information collections in other places and in other forms. These other collections will have an effect and they are going on now and will grow along side the library. There will be an increasing use of microforms for various purposes, a wide range of purposes, and there will also be many books--it will not be an either/or situation.

Human Factors

Scientists look at books as housing facts or data, but book materials contain a lot that is not in that context. Literature and history will be in books for many years according to some commentaries. That material which is primarily scientific facts or data will probably be preserved in different forms. People are partial to books; they don't like communicating through machines; they don't like to think that the humanistic element in life will disappear. Many things are not amenable to non-book treatment and these often have to do with the human element; in addition, you don't need electricity for reading books, you can read them in a brown-out, or in a car, or on a picnic, or lying in a hammock, and people are not going to give up that kind of luxury and be stuck in front of a computer terminal or a microform reader or other kind of fixed device all of the time.

Amount of Materials

Administrators are somewhat confused about the amount of materials on microform that will be descending upon them. Experts believe it will be an avalanche. The information world will be immersed in it. If that is true, then it will not be a question of centralized collections or dispersed materials, but rather that there will be so much that there will be viewers all over the library. There is a lot of microform material being published, much is now available, and more is coming. There is the capability of having tremendous stores of material and there can be computer terminals and viewers generally available for displaying the information. It is felt that if the libraries cannot comprehend this, and prepare for it, then another agency or activity will take care of the situation and provide service. Automation is here now and the marriage of the computer and microforms will change the environment of information creation, storage, and use; it was stated those people who recognize this present capability will be the information specialists of the ~~surface.~~ future.

Libraries Not Patronized

Patrons do not like microforms for many reasons, but students are not using libraries for their book materials either to any great extent. No library has a public relations budget and users stay away in droves. Librarians are saying that they no longer have an opportunity to point out to students what is available to them in their libraries during an orientation period at the beginning of the college career. If users can find ways to get their hands on information without bothering to go to the library they are doing so.

The Teaching Role

The librarian has a role to play in educating faculty and students in the use of microforms. They also can publicize resources so that users become familiar with the availability and the use of these materials. Orientation tours should be provided for all new students so that they are not strangers to the potentials of the library for supplying their needs in all forms of material. Students can be made aware of the fact that there are important sources on microform, such as newspapers, periodicals, special collections, and that librarians will help them in using these materials.

Computer Use

Budgets are very tight for the operation of college libraries. As far as computers are concerned, in many places even using computers for simple housekeeping chores cannot be accomplished due to cost. Support for university libraries is going down in many places and computers are one place that expenses are cut. It was suggested that the real economics of the situation may force use of computers because they can become an economical operational factor.

Regarding problems of copyright, the fair use principle prevails. The copyright problem is real and is being worked on at this time. However, there are a lot of materials not subject to copyright that could be made available for academic use by dispensing copies to students. There are people working on the copyright problem and they need the influence of users, as individuals and as groups. It was suggested these workers might be informed "not to forget the academic libraries." Fair use must prevail for the time being and the copyright situation will be clarified in time. Use of materials may be paid for through individual items paid by the user to the library, or through a licensing fee to the publisher for the library's use in appropriate fashion. There will be a way established to accommodate the use of microform materials in a reasonable fashion.

Copyright

About 4 years ago the Editor of the Princeton University Press published a widely circulated article in Saturday Review that suggested the time would come in the near future when publishers would make information available in whatever form the customer wanted it and would then sell a license based on something like student population (or other criterion) that would permit replication of the information in useful form. We have technology such that duplication and reproduction is going to go on regardless; all are aware of this but want to develop a means where duplication and reproduction take place at an economical level and also legally. The licensing fee may be the way this can be accomplished. Originators of material can price the information, regardless of form, to include copying. Copying is difficult to police. Originators of information can plan programs so the end user gets the information in a form he desires--it is just information whether on paper, film, magnetic tape, or a combination of media.

Licensing

There is some activity on the part of libraries to perform filming services in support of classroom activities but not in many places. Filming includes such things as slides and films of university papers as well as copying services. The broader definition of classroom support implies a current awareness on the part of libraries that they have a teaching function to perform in the library. One can look at the

Film
Services
Support

potential of programming with traditional materials in the classroom and there may be a natural alignment between programming and the filming of materials held by the library for the support of the classroom.

Planning and Proceeding

In developing an individual plan or program for a local library, decisions must be made and operations continue regardless of what the future may hold. It was suggested that holding back too much would be a poor technique because whatever may be anticipated will not be the fact for the future, situations will always be different than those expected. Administrators might identify what seems and appears useful in their own libraries and go ahead with making these materials, and these operations, the order of the day. Waiting may mean they will "miss the boat" entirely. By taking action, there will be some mistakes made but the library will still be in the picture.

User Resistance

Resistance of the patron to microforms has centered on inconvenience; they prefer hardcopy because it is easier to read, they are not tied to machinery, they can take books home, there is less eye strain, and they are not stymied due to breakdown of equipment. Librarians resist microforms also because they take space for reading areas, budgets must supply equipment for reading and reproduction, staff must be used for supervision and servicing, they must take the complaints of patrons when things do not go well; and there are numerous forms with which to be involved all requiring different types of storage and different kinds of reading and reproducing equipment. Part of the resistance to microforms comes from their serving a number of different purposes, such as reference and research study, and the systems for use in these modes are not well established in the library, as yet.

Mixed Response

When people show resistance to microforms, part of this is psychological and part physiological fatigue. The major impetus to use the materials initially has come from curiosity and from a need for otherwise available materials. Microform is difficult to use compared to hardcopy except for some specialized materials like newspapers. When a person works with microforms for an hour in the sense of abstracting information, this is a very difficult task.

Patrons do get materials in microform that they would not otherwise have available to them. They also may have access to a second copy when the initial copy is being utilized elsewhere. Some resistance is being broken down by familiarity with materials and viewers. Further, some resistance is disappearing because a new generation is coming along that seems to be glad to have the materials available and they are used to multi-media.

Additional Comments For Section A:

Librarians acknowledge the emergence of microforms for intellectual records of consequence throughout the academic library. But, the contest for dollars between books and microforms does not exist for IDENTICAL new materials. It does exist with regard to binding of journals as opposed to filming, or to the purchase of films. It does exist with regard to purchase of materials that may be similar but not identical. Preference for filming is given to materials that will have the greatest utility (a subjective opinion) and be the easiest to assimilate into collections. Precataloged microform materials get "a fair shake" but only if the cataloging is first class.

There are changes in education as a whole, and these changes have their effects on libraries in academic settings and in their operations. The changes in education exert influence on materials in all forms.

Libraries must be informed of future expectations in the way of new technology, be willing to accept what is useful with an open mind, and make use of what is relevant as it becomes available.

A clearinghouse for microform information that will inform libraries of what is going on in this field would be useful to librarians.

There seems to be a need for some major library or organization to assume responsibility for developing a strong collection of the rapidly growing body of literature on the utilization of microforms. If microforms are to achieve real importance in an academic library, a centralized collection of information about them would be helpful to the library community.

At closing, one participant suggested that this session had been a step toward problem definition, and the propounding of alternative solutions in some areas, but that with so much to be done additional sessions of like groups should be undertaken.

B. WHAT MICROFORM-RELATED TECHNOLOGY IS CURRENTLY AVAILABLE FOR PATRONS OF ACADEMIC LIBRARIES--AND WHAT CAN BE EXPECTED IN THE NEAR FUTURE?

QUESTIONS NEEDING ANSWERS:

What kind of equipment is suitable for library use?

What microforms best serve the library patron?

What is COM and what can it do?

Will older filmed materials be converted to newer forms?

Can a manual be prepared on microform use to advise administrators?

What can be done to standardize materials and equipment to reduce costs as well as the confusion of using diverse forms?

What can be done with equipment to reduce resistance of patron and librarian?

Can a single piece of equipment be furnished to handle most forms now being supplied libraries?

COMMENTS

COM It seemed that many administrators were not well-versed in the techniques of COM (Computer Output Microfilm). This capability has existed for a number of years. Eight years ago, eight companies offered it; four years ago four companies offered it; last year there were eight again and now there are thirty-six. There are certain basic techniques: taking pictures of the cathode ray tube, using an electronic beam to write directly on film, or energizing light-emitting diodes to bring light to a matrix to record characters. With these techniques you can perform sophisticated graphic tasks. An organization can acquire this system starting at about $50,000, plus a special camera, film processing, technicians, and-so-forth. Each new task requires programming. There are reports available on the technology of COM. For computer printouts you can get only a limited number of copies from the line printer; with film output utilizing COM techniques, the film output can be readily duplicated at little cost. The speed of writing computer output on film is very fast; many times faster than any computer printout on paper, being limited only by the speed of film progress through the camera. The film output is formatted by the computer in any pre-determined fashion.

How COM Functions

In detail, COM is a combination of computer techniques and microfilming techniques. One starts with the material developed on tape for the computer. The tape is imprinted with magnetic impressions that can be interpreted in electronic terms. That is the beginning. The tape is sent into a piece of computer equipment that interprets the impressions on the tape into electronic signals and those signals are used to control a cathode ray tube. It generates an electronic beam which is projected toward a phosphorous surface on the face of the tube. The beam can be deflected so that it actually writes on the surface of the cathode ray tube. When it hits the surface, it causes the phosphorous to glow and make a bright image appear where ordinarily the surface is dark. When the beam hits the surface, it writes a letter or character or a graph, or whatever it is directed to write by that magnetic tape put into the computer and the electronics in the computer that interpret the tape. A camera is fixed so that it takes a picture of what is on the surface of that tube. As the tube writes a frame of microfilm, the film advances to the next frame. Speed is limited to how fast the film can move. The film is exposed from the face of the cathode ray tube and then processed conventionally to get a positive film, rather than a negative master, as the original. You also have one other use of COM in that it can write with an electronic beam shooting electrons that write on the film. That's just another way it does the trick. Essentially, it is just COM. But what use does the library

COM For Libraries

really have for COM? There are a lot of uses for the output from COM but in the library we don't know of any place where companies are trying to sell this equipment to libraries.

The implications for libraries are obvious. They don't have money for such installations but they may be involved in collecting some of the computer output. Libraries have avoided such materials in the past because of the tremendous bulk of these materials but with film, 20 pounds of computer output on paper is about 6 ounces of microfilm. That might be maintained in libraries without too much difficulty. It would be possible to have some of this kind of material on hand in a practical form when COM supplies it although it would be impossible to keep it on paper.

COM Uses

One library is changing its circulation system to generate magnetic tape when books are charged out; this will go through a quick process with COM and the record will be on film the next day. Other uses suggested for COM are updated catalogs, circulation lists, serial holdings, plotted statistics. There are savings with COM of reduced costs from less printer time. COM output could affect the library as a micrographic medium which would be an intermediate in producing hardcopy printed text materials.

Colored Microfilms

Now that microforms are becoming more commonplace, the question of colored microforms is asked more often. Some administrators feel there is a real need for these materials. It was said present colored microforms are unsatisfactory for many reasons; they are difficult to read on many readers; they are not permanent color; they are expensive; they have poor definition; they have poor density. What was thought needed was a colored microform that would accurately reproduce, and for a long period of time maintain, color so that these films could be used for works of art and medievial manuscripts which cannot be used on film in black and white. It was thought the extent of need for colored microforms should be studied and if there is a genuine need then newer techniques might be pushed to develop colored microform materials. Much is spend now for lithographic reproduction which might be replaced by good microforms in color.

Color Technology

The dyes for present films are no more permanent than those for individual slides which are known to fade. Being able to code colors and reproduce according to a standard would be good. The initial exposure must be exact and even then the second and third generations can be affected in color. But, the microphotographer would be an expert and use a negative material under very special conditions. He would use a negative material to get the initial copy and then subsequent copies would fade, but the negative would not be likely to fade so additional copies could be taken from it later. After 20 years you could still perhaps get a true copy. There is quite a bit of data on the life of colored films. Ultra-violet light is the greatest enemy of all colored films or dyes. The more they are exposed to UV the more they will fade. If you put a normal color-type film away in good storage conditions and not expose it to UV it would have a long life. Diazo films are dye-type films and where the films have been kept in file there is only a negligible change. Where these films have been out and in use they are subject to change. The quartz iodide lamp in readers is very rich in UV and will fade dye films. Another factor is proper storage and care. For faithfulness of rendition, an expert who knows his business can get very close to true color but it takes a good technician with the right film and right processing. As to quality of colored films, this is basically a silver film on which the image is taken and the silver is taken away and replaced by a dye; in this process resolution is lost. If you start with a film of 100 lines per mm. resolution, you would end up with colored film with 40 lines only. There is that much difference between black and white and the colored films.

Quality

Equipment For Color

There is no reader-printer for colored film; at the present time one gets black and white from color. One way of judging color might be to photograph a gray scale and a colored scale alongside. Research has been done at

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Pierpont Morgan Libraries in New York and at Peterson Color Labs.

It was suggested the new American Films Institute would be a good source of information since they are concerned with preservation of motion picture films and copying nitrate film onto acetate. A secondary interest is the production of original color emulsions. Also, there seems to be a Swiss concern working on the problem of long-lived colored dyes for photographic films which have greater life than current materials; this was reported in recent photographic literature.

Colored Films Use

A further suggestion was that the library might restrict the projection of colored microforms to one or two viewers and that UV absorbing glass, which will do very little to change other wavelengths, might be used as filters in the condensing system of these viewers so that the life of colored films might be extended. Readers are coming out with tinted glass in the front and this, particularly the green glass, does very wild things to colored films. Those viewers with rather neutral glass are not as bad.

Administrators' Manual

For some years ALA has been considering the proposition that an administrators' manual on the organization and administration of microform collections and associated services would be desirable. They appointed a committee to determine the advisability of producing such a manual and the problems in producing it; this committee would be advisory to LTP. This will be discussed at mid-winter and comments are needed from the library community.

A Universal Reader

Many people have expressed the opinion that the library needs a versatile reader, of good quality, that is low in cost; these three things are not compatible. It is within the state-of-the-art to make a reader for a wide range of forms and with excellent quality but it would cost a great deal. Libraries want something good and functional under a variety of working conditions, and with many different operators. It was suggested that readers for roll film and for fiche must be distinct to perform their functions simply.

Human Engineering

In designing a reader, it has been suggested that it be engineered to fit people rather than to fit existing furniture. A desk-top reader does not suit the physiology of humans; the designer should begin with human engineering. People hold reading materials down rather than up to see them. The designer might start with the person and his eyes and design outward from there. A reader needs good illumination on the screen and also a long optical path for best results. These are difficult requirements for a small reader.

Comfort

"Creature comfort" is important in all study situations. This is particularly true in the case of microforms because of the necessary interface with a machine to obtain the communication. To facilitate comfort, the type of viewer is very important, the lighting, the work space, the position the user must assume in addressing the work, the chair provided for the patron, the location of the viewer within the library area, as well as the degree of activity in the surround. The availability of help to assist the user as difficulties arise is also reassuring.

User Studies

Studies are underway in several places to determine the needs of users in gaining information by way of microforms. An Air Force study is considering microform use for technical training to determine whether information other than narrative materials can be readily conveyed on film. The study relates to the use of schematics and drawings which students must examine carefully in addition to narrative materials. People with contact lenses and eyeglasses have particular problems in using microforms. Viewers are not built to provide a normal viewing angle and the head must be held in an uncomfortable position. The vertical screen is not a design for user comfort. Working from a vertical screen to notes on a desk means isolating both actions. They do not work in concert. This requires increased effort on the part of the user. When the convenience factor of having materials consolidated into a single source is introduced, users will tolerate more discomfort in using the machine to obtain their information than they would tolerate otherwise.

Library Readers

There was a requirement expressed for readers to be used in the home with library materials, but there are needs for readers in the library itself; for the library use the readers must be such that they will take a great deal of use without breaking down. Where a reader is to be used by thousands of people it needs to have few moving parts.

Screen Images

A long optical path makes it easier from a physics point of view to get a good image on a reader screen. Some manufacturers have done well in taking a short focal length and producing a good image but you have an easier task with a long focal path from film to screen. No quality generalization can be made because of other variables.

Communication with Manufacturers

A number of times the MPE reader was mentioned as being a dependable viewer which is no longer available; some administrators thought they were well rid of this equipment. However, the suggestion was made that librarians communicate more with suppliers in letting them know what is liked and disliked, useful or distasteful in materials and equipment used within the library. Being specific about requirements would be helpful to the library and manufacturer alike. It was mentioned that library administrators as a group could help in the design of readers that would function in a library. Comments are made on generalities but the librarians as a group might come to grips with the problem of defining explicit requirements for a library reader(s) and put them in writing. When the industry has been advised as to what the library wants they will supply it because they will then have a market. The difficulty, of course, is agreeing on what is needed since there are individual ideas about essential criteria. The industry would appreciate basic directions in lieu of specific directions if these could be agreed upon. (See recommendations.)

Loaning Equipment

As to portable viewers, students now have to use microform materials in the library where machines are available. Until low-cost viewers are generally available in students' homes, libraries might assist with loaning of machines. In this respect there are questions that an institution would have to address such as: How many machines should there be? Should all students be served with loan of machines or only faculty and graduate students? How long might a machine be kept? Should machines be spotted around campus in strategic places other than the library? Should machines, and also library microform materials, be loaned, and to whom? Who would handle such loans for the library, circulation or microform services? Who instructs in machines use, a librarian or a manual accompanying the equipment? If the machine is broken, who pays for it?

Damage to Materials

Comparison

Damage and shortening of the life of microforms is thought to be related to the degree of manual handling given the microform. Reliable equipment that functions with outside indexing would relieve people of the need to thread machines or pick up individual fiche. Such equipment needs to be available at a reasonable cost. Library materials are kept for long periods of time and are not considered to be for temporary use so they need to stand up to continued use. There seems to be no way to avoid damaging conventional roll film and individual fiche at the present time under these conditions. It was believed microfilm is more susceptible to damage than microfiche because it does not have random access and one must run the entire reel through the reader to locate materials; the film passing over the lens aperture becomes scratched; after several trips over the lens aperture, the film is damaged; if broken it must be spliced or replaced and splicing is difficult because frames are very close together. Microfiche seems not as susceptible to damage because the fiche is usually placed between two glass flats and the entire mechanism moves across the aperture.

Use of microforms and viewers is complicated by the need for proper furniture with which to use them. Some work

Furniture

was done at MIT in the area of design of furniture and the result was a drop-center table on which the reader is placed; this table unit has pull-out slides on the right and left at two different levels to take care of different sized people and the problems of left-handed persons. An integrated reference carrel developed at DU was described in which the machine and work surface are combined for maximum user comfort. Storage of microfilm in cabinets becomes increasingly expensive with a growing collection; different types of storage units are needed based on an expanding collection, availability to patrons, and cost per unit.

Publication Form

The microform selected for a publication should be compatible with the content itself and the planned use of the material; *Chemical Abstracts* is a good example of a best form for micropublications, and so are newspapers. There is no one answer to the selection of a form for a publication at this time; both content and use mode narrow the choices of form.

Evaluations

There are many subjective elements present in making evaluations of microforms and equipment. Statistical data in connection with these materials mean something but are not the total means for evaluation; how things appear to an individual and feel to him, and how he feels about them are all important parameters in making judgments. "You have to smell a rose to understand a rose."

Older Materials Revised

Most libraries now use 35mm films. They also have 16mm films, and these latter are extensively used in cartridges. There is a capability now to change from 35mm to 16mm. University Microfilms is coming out with 16mm materials that they previously had on 35mm. They are re-filming on 16mm but there is also optical reduction which can go forward in many ways. Others are taking 16mm and reducing it to 8mm for microfiche presentations. For newspapers, the films will probably remain at 35mm because of the original material's size and quality; the materials are of too poor a quality to go to a higher reduction ratio.

Photographing in a cine position on 16mm permits putting film into cartridges and this 16mm film can be read on a 35mm reader as in the past.

Choices

Libraries must purchase microforms in all formats because materials appropriate to libraries are made available in different formats. It may be found, however, that some materials are available in more than one format and the library has the opportunity to make a selection most suitable to its requirements; it is important that the form selected be the one considered most useful to patrons. Guides to quality of materials are not available, but the buyer can insist that the publisher cite the technical standards he has maintained for his product. Checking of incoming microforms for quality and completeness is not possible in most libraries and reliance on the publisher to maintain high standards of production is the present general method of quality control.

Dial Access

Dial access technology and equipment for individual learning might be used with microforms since most audio-visual materials have been adapted to this new concept. If the microform materials can be accessed by dial methods they might be used in conjunction with dial access equipment from many points on a university campus via closed circuit television.

High Reduction

In the area of ultrafiche, there are tradeoffs that come into play as one goes to very high reduction ratios. It may be technically feasible to reduce images to a point where an individual would have to use an electron microscope to read back, but the question then would be "Why?" What are the practical limits today for reduction ratios for microforms to be heavily used in the academic community?

Delay in Standards

The question was posed as to why the development of standards for microforms has been so long delayed while the development of materials and equipment in this area continues to mushroom. It might be that the formal development of standards within the conversant community has been well-nigh stopped by the rapidity at which developments have come about in recent times. The process of producing standards has been slow and laborious in that the procedure has been to obtain concensus and this means giving everybody a change to contribute his part to the whole. In our free enterprise system the people involved with the development of standards do not find themselves in a position to state what is standard and that will be the end of it. All the difficulties have to be resolved before a standard comes into being and that means all interests must be taken into account. There is further complexity in that the problem is not a static one, but rather it is a dynamic one; we do not know where this will eventually land. There are many parts to the microform medium at this time, roll film, microfiche, aperture cards, jackets, cartridges, that we have so far. There is a best use for each of these forms. It would seem impossible to work all of these diverse microforms into a standard form. There is a wide variety of interests. A great many manufacturers have something that won't work right if standards are established certain ways, and all must be satisfied. There is a micro-opaque standard and it is merely a restatement of what the manufacturers were doing at the time that standard was made. One thing that may speed up the development of standards is not to have representatives from all over the country come to a meeting place because they find this too expensive, but rather to have a local group, that can get together within automobile traveling distance, develop a standard and publish it and get comments from everybody. That is one way to get it off the ground.

Many Interests

Comment was made that American National Standards Institute is the most likely coordinating organization in the United States for standards and it may not survive if subscriptions are not adequate for operations. This organization leans heavily on various associations, professional associations. They understand that standards summarize already established practices.

Summarize Practices

Condition of Input

In developing standards, it was believed that involved personnel should know that for many types of materials which libraries work with the reduction ratios are too high; therefore the types of materials that libraries must work with should be taken into account when standards are developed. Many materials for libraries are taken from deteriorating texts rather than the clean and crisp documents prepared for new micropublications. Not only is reduction ratio one item for which standards might be developed, but quality associated with these reduction ratios might further delineate where these reduction ratios would be appropriate.

Family of Standards

The development of a family of standards seemed to be a reasonable approach to many; however, the achievement of a family of standards may be very long in process before anything comes out for utilization.

Volunteers

Work to develop standards is done by volunteers; in order that library interests and opinion be incorporated into the work of standards committees, library administrators will have to make some contributions in the way of staff inputs into this effort. In the library field there is an unbiased group of people in the sense that librarians do not manufacture anything. They are biased only on the side of users, which is an appropriate bias. Librarians could do a great deal if they had the time and money to devote to this cause. Volunteers must be supported in this work by someone who has a real interest in it. Of course, this is not a very dramatic effort and prosaic efforts generate little support as a rule.

Microform Projects

Standards adhered to by publishers offering microform projects will be discussed shortly in print since the ground rules for evaluating such projects has been developed by the Micropublishing Subcommittee from ALA's RTSP Resources Committee. Allen Veaner has authored a manual on this which is in press right now and should be ready in a few months. Projects will be reviewed in Choice Magazine.

This will include bibliographical information, the review being technical and bibliographical, but primarily technical. Standards for bibliographical tools with large microform projects need to be defined. These tools arrive in many forms; many cards supplied are not complete or accurate.

Microfilm Norms

ALA put out a publication Microfilm Norms, copyrighted by them but now out-of-print. This was a good standards manual. University Microfilms has this in out-of-print publications and can make it available. It is a small, useful booklet.

Quality of Materials

It is difficult to insist upon a level of quality when you must make a purchase because faculty members need certain materials that are sub-standard but available. Quality is very difficult to evaluate; but it was suggested that if something is not liked by people they can express that opinion and with sufficient expressions of this nature a quality judgment might be made. However, at times there seems to be no option not to buy something since it must be purchased in whatever condition it is found since often "something is better than nothing." However, publishers are commercial organizations and when customers register complaints they take them seriously. The library of Congress has standards of quality to which publishers must adhere or their work will not be accepted at LC.

"Use" Standards

The thought was expressed that it is a misconception to believe a stated standard ends a process; this rather provides a base from which to grow further. There are standards defined loosely as a kind of general concensus among users and the industry which eventually get down on paper in a written form, but a "use standard" may come about by accepting or rejecting the various materials that are being placed on the market and if a group of librarians would say what the needs are and that they will only take those things that supply these needs they would be defining a standard by use. Librarians have a responsibility to act as a group in determining, insofar as possible, the course taken in matters concerning their own areas of endeavor.

Library Market

Comments were made that the library world has little to say with respect to this industry because the library market is very minor to the entire operation economically. Materials are supplied to libraries as an afterthought and not as primary activities of the industry. But, before going to a manufacturer or publisher, the library community must establish requirements so that the manufacturer can understand just what is wanted.

Cartridge vs Cassette

There are discussions underway on standards involving the cartridge versus the cassette for microfilm. This is an important consideration because these are proliferating and are not interchangeable. ALA is involved in trying to resolve this controversy. It takes more than conversation to accomplish an objective. The need for a better reader has been identified for a long time with little attention being given to it; however, the cartridge or cassette is an important concept and has become a real concern because of implications in reader design.

Non-Standard Input

Lack of standardization in written materials has always been true; lack of standardization in microforms follows this same pattern already established in hardcopy. What standards the microform industry has today come from report literature that developed standard input. Until input is controlled there can be little standardization in output. Micropublishing of already recorded information follow the forms already established in hardcopy.

Additional Comments for Section B:

It was suggested that too much emphasis is placed on computer or machine-generated materials for microforms. There are millions of already existing books that have great value for research that should be available in many libraries in microform and these, too, should be easily retrievable and compacted.

A "family of standards" should be general enough to permit innovative development but firm enough to prevent incompatibility with presently used equipment. Present equipment should at the least be inexpensively adaptable to accept innovative developments.

It was stated that standards should never be so constructed that they are a straightjacket which stops experimentation and progress. Standards should permit revision, and be brought up to date, or they should be kept so general in the first place that revision will not be necessary for long periods of time. Present ALA Standards should be broadened to include other than microfilm.

Pressure is needed to obtain standardization from micropublishers, but librarians must agree on what is desired. They must agree as to what standards are most pressing and establish a priority. Then, large universities could exert some of their power to press for better quality. If the larger institutions do not exert this pressure on business the small institutions are not able to do a great deal. Standards should not come from business and manufacturing interests without pressure from the user institutions.

Standards are important but should not be restrictive to new developments; new formats should be compatible with present equipment with inexpensive adjustments. Copying capability should be available for all forms.

A publisher's procedure requiring a subscriber to purchase a hardcopy subscription to a serial or other publication before he can subscribe to a microform edition should be seriously resisted by the library profession in general.

Concrete recommendations should be made to manufacturers by the library community concerning these grave matters of policy and practice.

It was pointed out that there is systems logic in the current formats for microfiche since they follow three patterns:

Fiche--at 20-24/1 reduction, has a capacity of 60-100 pages on 1:1 basis.
Superfiche--at 40-100/1 reduction, has a capacity of 400-1000 pages on 1:1 basis.
Ultrafiche--at 100+/1 reduction, has capacity to 10,000 pages for collections.

One participant was interested in the reader carrel design presented in the ARL study by Don Holmes for the particular purpose of providing better conditions where libraries have to make the best of marginally adequate, inexpensive, microviewing equipment that is already in libraries or that may still be acquired. Some integrated designs, in addition to this development, have been proposed but not marketed. They might be marketed if a sufficient number of librarians should appear ready to purchase them.

The multiplicity of formats, modes, and reductions has not improved the overall quality of the readers available. Librarians, while hoping for versatility, portability, and reliability, as well as readibility, would be satisfied with the last two items coupled with acceptable long-term costs. Standards for readers will follow the development of good readers. We can't seem to write a specification for what we want until we see it.

No one mentions opaques; they are apparently "out," but we haven't seen the composite final answer yet among the varied types of fiche, film, and cards now available. Arguments will likely be settled by economical availability of large quantities of materials that become available in conjunction with appropriate systems. In the end, the best equipment may come, and the best media may come, from specialist producers rather than from big-name manufacturers who concentrate on larger markets.

One participant questions the relative positions of "user need" and "marketing determinations" in deciding upon a new microform project. Many librarians feel that most new projects are 99% profit-oriented.

All forms of microtext should, optimally, be user oriented. This being so, an individual using a film could have no strong feeling about the form, format, or reduction ratio; rather he would be interested in how to get the document, how to put it in a machine to read, and how to copy it.

User studies are just beginning and we barely have a terminology to discuss problems or goals; but work is proceeding and should give some useful answers.

C. WHAT LIBRARY OPERATIONS ARE AFFECTED BY PURCHASING OF MICROFORMS--AND HOW CAN MICROFORMS BE INTEGRATED INTO TOTAL LIBRARY OPERATIONS?

QUESTIONS NEEDING ANSWERS:

What manner of access will be provided for patrons so they will be able to locate materials held in microform?

How can a patron browse the content of materials held in microform?

Can microform materials be "loaned" to patrons for use outside the library?

To what extent should purchases of microforms replace binding of serials?

COMMENTS

Point of View

Several people made the point that there are two ways of looking at operational problems--the administrative view and the user view, and that both views must be taken into account. In any event, the user must be served to the greatest extent possible in all instances, and be the focal point in making determinations.

Binding Serials

Administrators have had to decide the issue in their own libraries as to whether they will bind serial publications after a specified time, or if they will replace these with film copies. In a few instances, film copies are purchased initially. The costs of binding and storing serials depends on the square feet of space devoted to serials and local rental costs. Roughly speaking, periodicals in microform cost about the same amount to purchase as the costs of binding and save about 96% of the storage space. There are formulas, which University Microfilms will supply, which can be applied to any library taking into account different kinds of bindings, different rental bases, etc. In making such determinations, the subject of mutilation of bound materials must be considered. Many felt that microfilm was the most economical course here. With microfilm, the materials are actually available whereas with the bound volumes this is not always true. An objection on the part of patrons is that microforms must be used within the library. A factor in making the decision to bind these materials might be frequency of circulation. It was mentioned that at some time in the future library operations may change from circulating to dispensing of materials, in which case patrons could be given copies of filmed materials for use and the library would always retain a complete file of material for other patrons to use.

Film-to-Film Duplication

Equipment is available for the copying of microfiche in a library. From the interest evidenced, this will be in demand. There are copyright problems to be considered but it was felt these could be worked out as the projected use develops. Copying a regular fiche is not expensive after initial purchase of the equipment. At MIT and other schools it has been found cheaper to copy a fiche and dispense it free than to circulate a book. It is not necessary to have a master fiche; distribution fiche can be used to make a duplicate (if it is not laminated). In some libraries the first copy obtained is never dispensed but is used to make duplicates for patrons. The copies currently are in low reduction; normally, to COSATI or NMA standards. One machine used cost about $4000 for a two-step process, a printer and a processor. Many high density ultrafiche cannot be copied because they are overlaid with a laminate that prevents copying. One reason for the lamination is to protect copyright but, most importantly, the lamination on high density microfiche prevents the user from focusing on scratches and dust on the surface. The lamination provides a high degree of security and also prevents mutilation.

Portable Readers

The circulation of microforms, or the dispensing of these materials supposes there will be many reading devices available to patrons, both in the library and in other places. It suggests that portable readers will be generally available and that many people will own them. The Office of Education funded a program for the design of a low-cost portable reader for the public and the result has been the DASA reader which is now available for $88; it is portable, lightweight, and can be held on the lap or on a table; it is designed for COSATI microfiche. It was stated that one of the reasons for success of tape recorders has been the availability of small, cheap equipment which creates a "use" standard. The achievement of a use standard might result from the provision of low-cost readers (utilizing a viable format) so functional that they will be purchased and widely used.

Library Technical Services

The amount of filming of materials accomplished by academic libraries varies considerably. Many times duplication departments are in dreary places, in the basements of libraries. Such departments do many kinds of duplication, ditto, xerox, and filming. Some departments are operated on a sophisticated level and include audio-visual services and even computer services as well as production of materials.

In-House Filming

Filming accomplished by libraries may be of many kinds; materials could include business records of the library and some of the rare holdings to be reduced to film to save handling of the materials. It was suggested that rare materials might well be filmed outside the library unless there was a great deal of this to be done so that investment in equipment would be worthwhile. Some institutions perform filming activities in a small way, utilizing student labor. In setting up an in-house operation the library should be able to justify the expenditures. Where reputable microfilm services are available, these may be the services the library should purchase for any filming needs; but, if such outside services are not available, the library may have to establish its own laboratory. In many cases, the materials needed may be acquired from an already published collection and these could be purchased. When a library feels justified in establishing its own filming activity, the best equipment is a planetary camera. The rotary camera was developed for the commercial world and could have application for card files. The materials to be used in a library need to be of good quality so a good camera is a necessity. The person to direct the filming operation should be technically oriented rather than a librarian; library guidance can be supplied to the technical head as need dictates. There is a book by Leisinger on microfilming that would be valuable in establishing a photoduplication service; also the Reproduction of Library Materials Section of ALA can advise of qualified assistance. As stated, the planetary camera is the basic requirement; if work needs to be done with a rotary camera it should be rented. Care needs to be exercised in establishing a reprography lab; the voice of caution was raised against filming things that aren't worth saving in the first place.

Specialized Materials

The opinion was expressed that a school that did its own filming was creating something unique and something that was wanted at that particular school for a special application there; such a school is creating materials on the spot for a special need and it should, therefore, service the need in such a way that students and faculty will respond to it more appropriately. However, materials can be bought for a fraction of the cost of filming, so to film when purchase can be made at a savings would hardly be justifiable. What is being filmed must be carefully controlled. It is often best to buy materials or to hire someone else to perform the actual filming.

State Papers

It was mentioned that schools often assume the task of filming state-wide newspapers that are not on film elsewhere. This is preserving the history of the community and is a service to scholarship. In some places state historical societies do this filming.

Very few schools have qualified microform personnel. Schools that now have small filming programs will be faced with larger programs as time goes by and there is no training program presently designed for preparing this kind of personnel. This must be done and it was suggested that the present availability of engineering talent might provide the human resource--if a program is developed. This should be important to the industry as well as to libraries; a

Training of Technicians

movement should be initiated to train personnel so that in five to ten years there will be people for all the libraries needing them. A problem of the audio-visual field is that the para-professional skills in the graphic arts and in electronics are very sparse throughout the nation. The best answers to this need, so far, are coming from programs in a few community colleges. Such para-professionals need to be trained for the microform field.

The Library Computer

In one institution the photo laboratory is adjacent to the library computer center; these areas were related in planning for future operations of the library. In this case the library is considered the data center on the campus, for all forms of data, printed, film, sound, and any other type. The university made a judgment to have all information storage and retrieval in one place, so all these activities and departments are in the library to conserve funds and provide adequate staff in a total operation.

The connection between the computer and photographic services is by way of COM and also information retrieval. The computer can develop catalogs for broad subject divisions on film; in the future the computer will be used increasingly to manipulate the materials held in the library collections. There is a relationship between the computer and the viewer by way of remote terminals. As the technology develops the computer should be increasingly involved in library operations.

One school (Pittsburgh) has divided its communications services into two categories, one supplying commercially available information, and the other supplying non-print resources for instruction and research. Here the communications center is part of the university library and maintains a TV center, graphic design center, audio-visual center, engineering and maintenance center, instructional development center, and liaison office for all resources.

When sending materials to anyone to be filmed, whether on-campus or off-campus, make sure they are knowledgeable as to regulations you want respected; many laboratories have never heard of Library of Congress Specifications for Microforms and have never heard of Microfilm Norms.

Filming Conformity

These practices should be insisted upon in any work that is done. If libraries have a filming operation, they might well make that service available to patrons. Some institutions do serve patrons in this manner, making copies of material on demand and also supplying materials to other universities.

Film Processing

As to the processing of films in-house, this should be approached with a high degree of caution because the proper processing of film is not a simple matter when a high degree of consistency of results is required and also permanence of the film. Equipment for processing is very expensive and very difficult to maintain. It requires highly trained technicians to operate it and is very much dependent upon having an adequate load on the system. You can't have a fine processor and do only a few rolls a week on it; the machine cannot be maintained. The library should find a good commercial processor for such service. It was urged that written contracts be obtained spelling out quality control expected. Filming might be done in-house but processing should be done by a good commercial house until volume is such that processing in-house might be justified. Very few institutions can support a continuous processing effort. For a small operation it might take ten years of processor utilization to amortize its cost as compared with sending film to a good service company.

How Much Equipment

The availability of microforms and use level of equipment in libraries are interdependent. To date, microforms in libraries have been predominantly archival in character. With growing emphasis on microforms of current content, use should increase to a considerable extent. Items of current interest will cause a heavier use of equipment than have items of archival character; therefore, it is necessary to be aware, in making plans for microform use, not only of the quantity but of the content of material acquired. In determining the amount of equipment needed in the library for the support of microforms, considerations include the quantity of materials, the kind of materials (archival or current), the number of patrons and the extent of their use of the library, and the degree of standardization of forms. Another factor would be the library operation, whether centralized or decentralized.

A-V Consolidation

Consolidation of audio and visual materials in a library into one area presents certain advantages. Both audio and visual materials require machines and uniting them in the same area enables the library to hire technicians to maintain machines and assist in their use; these forms require similar, specialized, storage facilities as opposed to standard stacks for books and periodicals. Both viewing and listening machines require large numbers of power sources; it is more efficient to provide the extra electrical outlets in one place; these forms also require special ordering, processing and bibliographical controls. However, there are disadvantages to consolidation of these materials, namely, viewing and listening are distinct functions that most often require separation, and quality of service is more important than technical efficiency. Viewing requires reduced illumination in many cases whereas listeners may be inconvenienced in a darkened room.

Decentralized Microforms

It was postulated that microforms and associated reading equipment have been located traditionally in a special area in academic libraries for convenience and security. However, in larger institutions, these materials are often divided by broad subject categories and housed divisionally with reading equipment appropriately duplicated. Decentralization presents some advantages in that microform materials are kept with the eye-legible materials of the same kind; this allows for special reference assistance in the use of materials. Decentralization has disadvantages in duplication of reading and printing equipment. Often decentralized locations have restricted hours of service. Further, fragmentation of collections into specialities within libraries makes it difficult for librarians to control materials that might be grouped into various special collections.

Planning Facilities

In planning new facilities, the question of centralized versus decentralized handling and storage of microforms must be answered. Additional readers and the possibility of duplicate materials may make it less necessary to centralize microforms and associated services. It was suggested that in planning for a new building, if it were modular in concept, the question of exactly how the library would be operated and the location of materials within the structure might not be stringent. It might be possible to centralize until such time as microforms become excessive and then to decentralize them into departmental areas with other materials in hardcopy. Local conditions will have to determine these points for the time being because in some situations users would be better served in a central place whereas in another situation users would be better served if microforms are dispersed. Costs are not identical at this time for these two alternatives and cost is an important factor in making a judgment. With limited budgets now, it appears most practical to locate equipment in a single place and develop a resource center to handle all kinds of different forms.

Centralized Microforms

With centralization there is the problem, always present, of not having materials of similar content in the same place. There will have to be a working back and forth between "subject" and "form" for many institutions for some time. Centralization does create problems for organizations operating on a divisional basis. Having some of the subject materials separated out because of form may add to the librarian's resistance to microforms; he is less familiar with the isolated materials and does not handle the transaction with the patron when they are involved. It was thought this might indicate a change in the direction of contemporary librarianship; he should no longer be competent only in handling information in a single or limited media; he should be well informed and comfortable in handling all types of media and it may be that library schools are not training people to do this. One danger is that librarians tend to transfer their prejudices to patrons.

Materials Integration

It was recognized that we are involved in a multi-media approach to information and if we could have an integrated approach with all materials it would be desirable. Separation is not desirable, but it is a solution to handling the materials for the present. Placing materials in a subject category may not always best serve the interests of patrons, especially when new areas develop or when an interdisciplinary approach is taken in a study development. There have been shifts in the way we deal with knowledge. Some experiments have been undertaken where universities have abandoned the divisional arrangement in their principal buildings. Centralized reference services are undertaken but are strengthened by designating librarians as subject specialists and allowing them to work in an area large enough to accommodate their primary bibliographic tools and to associate, at the same time, with other subject specialists; in such situations centralized microform collections are quite obviously called for. This approach is similar to the concept of team teaching. Accessibility to microforms is essential to overcoming user resistance. User patterns must be studied and examined to determine how to make materials most accessible, and the result may not be most economical to administer.

Distinct Collections

Some libraries having divisional organization do not separate out government documents and other major collections. Others do make separations and have reported that they get much more active use than previously. Collection sub-sets are identified when the materials are first received; they are then marked for the division that will utilize them. This is indicated by a block assignment of a broad subject area.

Best Present Environment

Often where material is decentralized you will find that the equipment and materials are badly housed, badly kept, the machines not serviced properly or well. You see the best user environments for microforms, at the present time, where the microforms are kept in a centralized location where they can be adequately taken care of. This equipment needs a complex of power outlets which can be established more easily in one central place. Centralization within decentralized facilities is thought by some to be an ideal situation. In making final judgments, the administrator must consider the size of the library, the organization of the library, the size of the various microform collections in the library, how many collections there are as well as how large the collections are, the operating budget, the available staff, available equipment and its special function, the physical layout of the library, and many other variables. The relationship between these variables has not been developed at this time: therefore the administrator must still rely on his experience. In thinking toward the future, information in ten to twenty years may be handled very differently from the way it is handled now. The computer will permit decentralized access from centralized sources. It will handle a great deal of the library's reference requirements through its programs.

Integration
Thru
Bibliography

The integration of microforms into conventional library systems may best be accomplished bibliographically rather than physically. The formula for cataloging and indexing is well established by the Library of Congress and the Anglo-American Code. A catalog card set bears the same bibliographic information for microforms as that given for books; notes on the cards identify the physical format, and the classification scheme may represent either subject classification or simply an accession number. Cards for microforms can be inter-filed into a library's card catalog and into any book catalogs. Ideally, there would be a card catalog representing the microform collection located in the collection area for use by patrons and library staff. As presently set up, there seems little advantage to be gained by the user in browsing through the physical microforms; however, catalogs and indexes, and abstracts may provide some means for browsing in these materials. In arranging the materials, an accession approach is probably sufficient. Classification would be helpful so that the official shelf list on a particular subject would reflect all materials regardless of format. Report literature, such as ERIC is generally seen as an exception to the card catalog approach.

Librarians vary in their methods of providing bibliographic control for microforms and it is often difficult for patrons to determine precisely and quickly what information is contained in microforms in a given library. The quality of bibliographic information provided by the producer varies as well as his format. Individual libraries spend a lot of time in trying to develop guides to their own collections. The ARL Study, sponsored by the U.S. Office of Education, and conducted by Felix Reichmann of Cornell, has issued the first part of its report on the subject of bibliographical controls. This report is in the ERIC collection and can also be obtained from the Association of Research Libraries. This initial report raises questions on the subject and the participants were hopeful that many questions will be answered as the ARL Project continues.

Present Microform Access

Often the academic library user first encounters microforms while searching the catalog for a specific monograph. This accidental exposure to microforms is the result of substitution of the microform for hardcopy. In this case, the bibliographical treatment of the material in question is the same as for the hardcopy edition but highlights the difference in physical form. The user then finds out how to obtain and read the material that is held in non-print media. But, only a few students learn of the broad spectrum of resources, both contemporary and retrospective, available in the library on microform. Works keyed to standard bibliographies, but uncataloged and unanalyzed, are likely to escape the user's attention unless responsive and knowledgeable reference assistance is available. Many microforms are not keyed to standard bibliographies and lack description so are not used.

Accidental Encounter

It is agreed that it makes no difference what the form of material, it should be represented in some form accessible to the user so he knows that the material is in the library. There is no reason why materials recorded on film should be less accessible than materials recorded on paper. It was commented that in whatever way you might present book material to the reader, it is equally important that filmed

Card Catalogs

materials be accorded this same presentation to the user. If documents in hardcopy would always be represented in the card catalog, then documents in microform would be represented in the card catalog. If a book in hardcopy would be represented in the card catalog, then its filmed equivalent should be so represented. The fact that it might appear in a microform listing would not be sufficient. It was asked whether or not the card catalog was the best means for bringing about the integration between books and non-book materials. There are some anthologies (like "Landmarks of Science") for which there are no composite entries, but the works are represented. This is an example of an artificial set.

Other Non-Print Forms

The point was raised that there are other forms besides microforms and standard monographic forms. Other forms include motion pictures, recordings, art works, maps. Microforms were suggested to be just one part of the larger problem. However, the catalogs in libraries have traditionally been built around monographs and patrons expect to find materials of that nature listed there. With new forms it is difficult to decide how to access them; there is no standardization as to what practice should prevail. Catalogs have grown and become cumbersome. It was suggested that in controlling microforms the libraries need to look at the whole problem of controlling, not just literature, but rather information. Patrons have been trained to go to the catalog to find the resources of the library. With other kinds of materials being added to collections, it might be wise to establish guide cards in the catalog alerting patrons that there are materials in other places such as government documents. These should be triggered in the card catalog for particular subject classifications.

Other Material Classes

A large body of materials is not in the catalog, particularly journals, but in this case there has been developed a set of useful guides and patrons are well versed in their use. For documents that have been in the public domain since their inception there is a means of control to locate the information they contain. But for microforms, there is no equivalent type of reference. These are inhabiting an entirely different world in relation to bibliographic access. Librarians are very much concerned about letting the expanding microform industry know that some technique must be developed which will enable libraries to have all these new materials represented in their catalogs or a supplement to their catalogs. There are different special instruments for special book collections that lead one to pertinent books, but the books can also be located independently. The library must bring the different forms together and have access to a wide range of types of material, in whatever form.

Material by Category

It was said that libraries must consider the category of material and not the form it is in. For government documents, people wanting that type of information know it is not represented in the public catalog. Those documents are in a category of material understood not to be in the public catalog. There are individual maps in special collections. Many libraries do not report purely musical scores or recordings in their main catalogs, yet some libraries have determined that a recording of a play that is represented in hardcopy will also be included as a recording in the catalog. If the material in hardcopy would be listed, then the same material in microform should be listed. The category of material would be the determining factor.

Multiple Systems

There is difficulty in having titles of like materials listed in separate systems: the hardcopy listed in the catalog and the microform in an index which may be only one of many such indices. A "cumulative index" to a library's holdings is needed so that librarian and patron alike know what is available; the holdings of an individual library are not being consolidated. There is an index to microforms in the National Register of Microform Masters, although this is not complete since many individual libraries do not report. When blocks of monographic materials are not in the card catalog, the library is vulnerable to duplication of materials through new acquisitions. When a library gets 15 to 20 different collections of many titles, then personnel do not remember to look through all of them to see what titles are already in the library when ordering new materials. The library staff itself does not know what is in all of these collections. It was said that something like Swan's Catalog of Recordings would be very helpful for microforms. This would list for every microform title every printing that was made for it. This would be a single recognizable source. This could be done once for the whole country.

Standard Indexing

Microforms can be used as machine-readable material so that if they were formatted in some standard way as to bibliography, any library receiving them could feed them to a reading device that would present the information in any form that would be useful; for catalog cards or for composition of an index or catalog or whatever breakdown might be desired. Publishers are now indexing their own collections but this is not done in a standard way. Many are developing access tools of some kind so that the content of their projects can be known within the library. It is disconcerting to buy a rare book and then find that it is already in one of the collections in your own library.

Regional Centers

Microform publishers are developing duplicate materials in the same manner that reprinters have done; the same materials are being offered by a number of publishers. It was felt there should be some coordination between reprints and microform publications so that the same materials are not included in collections from many sources. The suggestion was made that a university might serve as a regional center for cooperative ordering, cataloging, and inspecting of microforms, with operational expenses coming from a group of participating members in the region.

Additional Comments For Section C:

Library schools should provide up-to-date instruction on micrographics and its relationship to library collections. A corp of creative librarians is needed who are motivated to specialize in the micrographic form of information storage.

Many administrators feel that professional librarians do not have a desire or the time to assist in technical aspects of microform use and that sub-professional personnel could be utilized for these tasks. Library Technicians could be trained for this specialty, and as they pursue areas of study, one of these could be the use of microforms. Library Technician programs are available in more than 100 junior colleges and the microform specialty could be included in those schools to create a category of Library Technical Assistants. If microform work should not claim their whole time, the technicians could be used for general library work.

Retrieval systems and bibliographic controls are an absolute necessity if microforms are ever to achieve widespread or routine use. There must be agreement reached on the method to be used for this control. Presently there is wide disagreement on what these controls should be; traditionalists want to rely on card catalogs and the less conventional look upon large microform projects as adequately entered through guides or annotated book bibliographies. In any event, all agree that microform projects should be critically reviewed as to content and technical quality.

Where bibliographic tools are needed but not commercially profitable, an organization like ALA or ARL might underwrite the task and share cost with the membership. Another suggestion was that perhaps the Library of Congress could issue cards for all types of microforms in the same manner as they do for books.

IV. CONCLUSIONS AND RECOMMENDATIONS

Statement

The following general conclusions represent a concensus of opinion as voiced by the conference participants. They represent a summation of certain of the areas discussed in Section III of this report, particularly of those instances where quite general agreement appeared to warrant position statements.

* * * * * * *

I. Recommendations concerning bibliographic control of microforms;

- Support and encourage the Association of Research Libraries' Study of bibliographic controls conducted by Felix Reichmann.
- Establish a formal position concerning those bibliographic tools that the publisher should be expected to provide with his publications.
- Support this expectation through boycott if necessary. The library community has the necessary professional associations to both define expectations and to identify acceptable publications and the library community should accept this responsibility.
- Encourage support of the National Register of Microform Masters. The Register is presently incomplete because libraries have not reported to it, and many are ignorant of it.
- Request the Library of Congress to expand the capability of the National Register and consider the creation of microform analytics in more complete form.

II. Recommendations concerning microform viewers:

- Work to better identify the types of reader equipment that are suited to the varied uses of an educational environment, and encourage the U.S. Office of Education to continue its sponsorship of research in this area.
- Endorse the integrated reference carrel concept, which equipment is designed for reference work as opposed to research or study uses. The reader-carrel should be designed to facilitate relatively short duration microform transactions where the user clearly understands his immediate needs; and includes reader, work surface, and control of local environment including illumination; this equipment to facilitate a major portion of current library microform reader requirements. Equipment manufacturers should be alerted to this equipment need.

III. General Recommendations:

- Work to create training programs to produce qualified people for careers in photoduplication; the paraprofessional concept should be developed in concert with the microform industry.
- Suggest the inclusion of microform technology in the curricula of library schools so that graduating librarians will be versed in microform use; and encourage the training of currently active librarians in the use of microforms through seminars and short courses developed specifically for their benefit.
- Create at some institution a library of microform technology which is complete, recognizing the critical need for centralized information relating to all facets of microform technology operations.

- Consider the premise that a total microform system is the key issue; development of a total approach to library microform handling and use will answer many separate problems such as bibliographic controls, indexing, use modes, equipment design and quality and that total system design is the long-term approach to achieving useful interface between microforms and information transfer in libraries.
- Understand that the library community has played a passive role in the evolution of library-related microforms and that it must begin to define its own needs so that the industry can respond to requirements rather than attempting to define them.

V. SPECIAL EVENTS

Statement

During the lunch hour on each day of the meeting, special presentations were made; these are reported upon below. The gentlemen who kindly gave this information to the meeting did so at no cost to the Conference, and their contributions were very much appreciated by all participants. In addition to the three presentations discussed below, the Conferees were privileged to view the Stanford University film: "Spires/Ballots Report" through the good offices of Allen Veaner who made this excellent, illustrative movie available to the meeting. This film was awarded first prize at the autumn 1970 meeting of American Society for Information Science in Philadelphia. Additionally, on Tuesday, December 8th, the University of Denver Library held an "Open House" during the evening, so that participants might see that operation and what has been done, just recently, at this medium-sized, rather old, general library, as first steps toward bringing microform materials within reach of users and, in the process, learning what must be considered for microforms use when planning a new library facility.

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Mr. Lew Zeh, Jr. of Arcata Microfilms presented a film and slides for the National Microfilm Association. This information related to microfilm technology.

ROBERT A. MORGAN

Mr. Morgan is President of Morgan Information Systems, Inc. His company has evaluated various microform readers for the Library Technology Program of the American Library Association.

READER EVALUATIONS

The reason I was selected to give this luncheon talk is because of the work we recently completed for the Library Technology Program in which we evaluated a group of viewers with a particular eye to their suitability for use in libraries. We were selected to do this because we have an extensive background in optical instruments and don't have any products competitive with these viewers; we could be intimately conversant with the technology involved and still able to evaluate this work impartially.

When we first became interested I thought it would be easy to develop some straightforward criteria by which to evaluate this equipment and could measure the selected viewers against these criteria. This was obvious to me before I started but I found it is a lot harder than you think it would be to evaluate a viewer. The first thing we found out is that there is a contest going on between micropublishers to see how many shapes and sizes and reduction ratios they can come up with. This, of course, introduces a problem. There is a problem also from the manufacturers point of view, for the people whose viewers we were evaluating; I think it is good to get other viewpoints here. Most of you are librarians and you can agree with each other how awful this situation is and that better viewers should exist, but it might be interesting to see a little of the other side, what a manufacturer might be looking at.

Confronted with this wide variety of forms he is going to look for some kind of design that will have a wide market so he needs a substantial amount of versatility. Try to imagine yourself as a manufacturer about to introduce a new product. The first thing you think of is the Edsel. You don't want your product to be an Edsel. You are going to be putting a lot of money out to introduce this product. Even a very simple product like a microform viewer represents a very substantial investment. You couldn't do it, except under unusual conditions, for less than $100,000. Probably it would cost $300,000. This goes into engineering design, and tooling, and manufacturing startup costs, and sales promotion. It is a very costly business to launch a product. Think of what this means in these terms; as a conservative estimate you are going to spend $100,000 to do this, and you have to make some money back. If it turns out well you can make 5% on your sales. Internal revenue will let you keep 1/2 of that so you make 2-1/2%. If you put $100,000 into the development, you have to sell $4 million in viewers just to get back what it took to get started. That's a lot of viewers. You have to look for something with quite wide applicability. You might have some idealism and think you will make the best viewer in the world. You see what other people are doing that sells and you think at least you will get your share of the market. This is why the readers that you see on the market tend to cluster around sameness, as it does in very many products. It's like a distribution curve with some very good at one end and some very bad at the other end and most of the viewers are sort of in the middle. You might wish this were not true, but it is a point of view that does exist, so it tends to explain in some measure why you get what you do get.

The LTP report of May 1970 that we prepared covers the 10 viewers we evaluated. There will be another report in a few months on another group of viewers we are working with now. It just came to my attention that there is a report by Sherman of Saginaw, Michigan that may have interesting information of this nature. In evaluating the viewers we used some elaborate instrumentation that would not be available to you, but I want to talk about the things we did in ways that might suggest things you could do in evaluating your readers. There are two things you have to consider (1) what the reader is for, and (2) how it will perform: what it does and how well it does it. In considering what it is for, there are two aspects to this, (1) what microforms you want to use it for, and (2) what environment you will use it in. The environment consists of ambient conditions and the personnel that will use it. As for the microforms, we have been distressed by the proliferation of them. If you try to select a viewer that will cover all of them you will do it at the expense of other advantages so you might give consideration to having several kinds of viewers. You might not have your equipment like a fleet of cars that are all alike but rather have some for different, specific purposes. You might get the best performance-to-cost ratio if you do this. If you get a viewer that satisfies 90% of the users most of the time and some people have to go elsewhere part of the time for the other 10% of their material, that may be a good buy; if you try to get equipment for all-inclusive coverage you may pay quite a lot for that. You have to consider what microforms you will be using and whether positive or negative, and so on.

For the environment, the illumination of the screen is very important and you probably don't want to make users go into a dark closet to use the readers because it is hard to take notes there and the contrast is disagreeable. If you have a bright reader in a dark surround that is very tiring on your eyes. It is like working on a dark desk and having a light paper in the middle of the desk. The pupils of your eyes don't know whether to enlarge or contrast. They don't know what to do. You may notice it is more restful to work on a light-colored desk. The same thing is true here. You would like to have a reader that you can use in a quite light environment. As far as the personnel who will be using the readers are concerned, if you are selecting for one person you have more freedom than if you are selecting for public use. For public use you have to have something with clear and simple instructions. One person can learn to use a complicated machine, but you don't want to have to spend a lot of time teaching and re-teaching all the users. These matters of the environment are important matters. Mr. Wheeler mentioned this yesterday, that the same viewer may perform well in one situation and be very poor in another situation. You can't just take somebody's word as to whether or not one is good and one is bad. You have to consider carefully the use environment. The physical situation is important and also the kind of users.

How well a viewer performs becomes largely a matter of image quality and the convenience of the controls. The image quality can be evaluated by considering the sharpness of the image, the quality of illumination, and the contrast. The sharpness of image is difficult to define. One way is in lines per millimeter of resolution. Another approach is in terms of modulation transfer function. Neither of these is 100% right. They don't have a one-to-one correspondence. Modulation transfer function is difficult to describe and to measure except in a laboratory with special equipment. It tends to show the gradual deterioration of image quality as the material that you read gets finer and finer. Lines per millimeter also tends to do this but you can sometimes have poor value in lines per millimeter and have very readable images on the screen. You are better off to compare viewers than to compare numbers. Even if your numbers are very scientifically prepared, comparing numbers is not as good as comparing images on the screen because you get the whole environment when you compare images. If you are forced to have a numerical measure then you have to use it, but this number is a subjective thing and two different people get different numerical answers.

Another matter that is important is quality of illumination, whether or not it is sufficient and whether or not it is even. The sufficiency is not too great a problem; often it can be improved by reader position such as not having the viewer face an uncovered window or not having it directly under a light. You can find within a room some positions that are better than others for viewers. What is very important is the evenness of the illumination. If you see a bright spot in the center and dim corners, that is a very tiring situation. It is like working with a light paper on a dark desk. Your eye works differently under different circumstances. This may be a coincidence, but people used to use dark wooden desks more than they do now and they had lower levels of illumination than they do now. In that low level of illumination the dark desk may have caused the iris of the eye to open up so one could see better what was on the paper. Now, in typical office situations, you have bright lighting; if you have a dark desk it opens the iris and it is open too wide to look at a white paper. This is like a viewer; you want it in a fairly bright room, to have a bright screen, to have a lot of contrast, and you want even illumination. Sometimes the illumination of a screen is so uneven that if you move your head to one side then one side of the image will almost be extinguished. It is very tiring to have to keep your head in one position for a long period of time. You can make measurements of illumination with a meter or you can just make comparisons of the viewer. It is easier in this case to take numerical measurements and compare them but you still should compare the viewers.

The viewer with a "hot spot" or bright spot in the center is a very tiring one to look at. This is often a problem in a viewer with a short optical path (which is usually to say a small viewer). You could have a small viewer with a folded optical path of mirrors in which case you probably would have better eveness of illumination. Anybody who is a photographer will understand this readily because when you have a wide angle lens on your camera you tend to have underexposure in the corners; the same condition prevails here plus some other things. The short optical path is equivalent to your wide angle lens in the camera and you don't get good corner illumination. Something you should look for in this connection is quartz iodide lamps. These are very good lamps but, typically, they don't have a fixed relationship between the filament and the socket. If you have just put one in the socket where the last one came out, in exchanging a burned-out lamp, you may not have the filament in exactly the same position. A viewer like this should have some provision for focusing this lamp. You should be able to move it around a little bit and you should be able to view the screen while you move it around because you don't want to have the situation like you have with a TV set: when you move the controls around you can't see the screen and if you are far enough away to view the screen you can't reach the controls. For the viewer, you would want to see the screen while making this lamp adjustment because, outside of a laboratory, the only way you can get the adjustment done correctly is by looking at the screen to see when you have even and bright illumination. You also, in all cases, should use the lamp recommended by the manufacturer and be sure it is down firm in the socket because just a little displacement of that filament can destroy the image quality and evenness of the illumination; you might think the viewer is very bad when it just needs to have the filament adjusted correctly.

Several people have mentioned ambient lighting and the difficulty of using a viewer in bright situations. One thing you can do is simply reverse the screen. That diffusive coating on the screen is usually on the inside to protect the screen and it ought to be on the outside for the convenience of the user. It is true that it will eventually wear out and get scratched, but you are really trying to satisfy the user rather than to protect the screen; so if you turn it on the outside the user will be much less sensitive to reflections from lights. These screens are quite durable. You can get them scratched and they won't degrade the image too badly. Material in spray cans is available that will freshen a screen that has been damaged. People take much too good care of the screens instead of the people using the viewers.

About contrast, this is apt to be more trouble with positive than with negative film because there is more light getting inside the viewer. Lack of contrast arises when extraneous light gets up on the screen from being reflected around inside the viewer. Then, it washes out the contrast between the light and dark areas. Unless you make careful measurements you can't tell whether it has good contrast or not. You just see a degradation of image quality. Again, I would advise comparing viewers because when you compare the composite image on the screen you don't care what reason it is that makes the image bad, you just care about the composite image.

Curvature of field is another thing. An image does not come to focus on a flat plane. Most often it comes to focus on a spherical surface. The screen is a flat plane so you have to find some good focus about halfway between good in the center and good in the corners. When you are checking resolution you shouldn't just look at the center of the screen because that's where the lens image is best; look also in the corners. It is hard to read on a viewer that you have to keep focusing when you go from the top to the center and then on to the bottom. This will occur when you have excessive curvature of field. That's a viewer to reject because you can't correct that problem. You don't get very good pictures with a wide angle lens and this situation is like that. It is hard to design such a lens that is well corrected. This speaks in favor of a large viewer with a long optical path which usually means a large box. You would like to have a small viewer but this is one of the trade-offs you have to make. This doesn't mean that a large viewer is necessarily going to have a good image, but it is easier.

Another distortion you may have is something also recognizable by camera people and that is a pin cushion distortion or barrel distortion. That occurs if you project a square image and it comes up on a screen as a pin cushion shape or where the sides bulge the other way. This is not necessarily bad for image quality in terms of reading and if you don't notice it just by looking at it that may be all right, but there might be some cases where a user that you are serving would want to make measurements from a graph that is being projected and then you would want to give thought to this distortion. You can just hold a ruler to the lines and see if they are straight and up to the left hand margin and see if that is straight. There is also a keystone distortion and this is not a defect of a lens; it results when a mirror is out of position. This could be an ordinary defect that would suggest condemning a viewer that otherwise was good. A screw could shake loose in shipment and a mirror could get out of adjustment and the image would come up to the screen with a keystone shape. If this happens you cannot get good focus all over the screen, so if you cannot get good focus this may be the reason. A mirror can be put back in place.

Another thing that affects image quality is how flat the film is held. If the film is not perfectly flat between plates there is a good change that some parts of the film won't come to focus on the screen. This is a very sensitive thing; one-thousandth of an inch out of position can be recognized as a degradation of performance on the screen; a good quality image is that sensitive to the position of the film. This is a problem with cassettes. Some cassettes won't hold the film very flat. If the film is not flat, you will lose good imagery by the curvature of the film. This is a highly magnified problem when it reaches the screen.

There are some other things that could show up, but all of them affect image quality if they are important. If they don't affect image quality then they aren't important. The best comparison is image quality. The best test is "try it before you buy it." Don't pick it out of a catalog. Test it out in the real situation.

There is another kind of viewer that will be finding its way into the library environment soon. This is the viewer associated with its own film in some sort of a self-contained system. This may add to the proliferation of microforms but it probably will be acceptable because the film and viewer come as a package so you don't have to worry so much about it. Representatives of this type are Microform Data Systems, NCR with their photocromic system, Image Enterprises, Library Resources, and a new device my company has just introduced. Probably Image System's Card Systems should be included in this. Various reduction ratios are being used: 200x, 150x, 100x, 70x, 42x, 24x.

I have had some reservations about describing equipment that my company is putting out because I didn't want to interject a commercial note, but in view of the interest in this subject I will describe it. We have a storage and retrieval device. It is helpful to put such a thing in an economical context because you can imagine better where it might fit. Depending upon configuration, it is from $5,000 to $8,000. This device is a box a little smaller than an office desk and has two films in it. There is a main data base on 105mm film and an up-date film on 16mm film. The main data base is laid out in fiche format just like you were making microfiche except it isn't cut--it is left in a roll. Every image space on it is assigned an address which has 3 coordinates, a fiche number, a column number and a row number. In many situations you get information on film that tends to become obsolete and here and there a frame is out of date. That's why we have the up-date film so you can generate, very inexpensively, just those images that have become obsolete on the main data base. Beside each image on the up-date 16mm film we have a machine-readable code that designates the address that is being replaced by this image. It has a fiche number and column and row taken from the main film. You enter the system by keyboard or by computer. If you enter by keyboard you key in a 7-digit number. Then both of these films are searched simultaneously. If the material that you have requested is on the up-date film that frame comes up to the screen, but if that number is passed on the up-date film is signified there is no such up-date frame and the main data base is valid so that comes up to the screen. On the 105mm film we have about 100,000 pages. An alternate way of using this is to consider those situations where you don't know the address to which you want to go. In that case you may wish to converse with the computer to help with the identification problem and over a phone line the computer will direct the user to display on the screen the image that will be an answer to the inquiry.

This equipment is a sort of descendent of the Intrex work and that described by Mr. Pemberton for the New York Times. I guess a lot of other things are going on in this same area. If it seems like a lot of money that MIT has been spending in working out Intrex, you can see there is a very useful fallout from that because this system we have been using was developed by Roger Summit at Lockheed with a great deal of influence from Intrex. Such projects have continuing side benefits not immediately apparent. We have demonstrated our machine; the computer was at Lockheed in Palo Alto and we were in Houston. We had on film abstracts of OE documents. The computer was programmed by Lockheed to know a lot about these documents and can identify them and locate them on the film. A user could sit at the teletype and ask the computer questions and get down to a number of abstracts he wanted to see. The computer then would send the addresses for these and they would come to the screen sequentially.

Lockheed's program is called DIALOG and you don't have to know a lot about the articles to get what you want. These kinds of systems we have felt were just around the corner for libraries and I think we have just turned that corner.

Mr. Thomas Lee presented a sound-slide study which told the story of microfilm's use in the mid-1800's during European wars, when film was sent into Paris by pigeon--the famous "Pigeon Post."

Mr. Lee has been involved in studies of microfilm use with secondary school students in Michigan. The results of his studies are summarized as follows:

1. Students accept micrographic technology more readily than do teachers.

2. Due to unavailability of suitable portable viewers, a reader-printer is necessary.

3. Students like negative microforms better than positive microforms.

4. Negative microforms hold up better under extensive student use.

5. Students like the historical aspect of microforms, i.e., going back to the source materials.

6. Students learn as much from microforms as they do from any other form of printed materials.

7. Microforms can be used to motivate some students, but not all students.

8. The concept of replacing bound volumes of periodicals with microform editions is not recommended.

9. Planning for microform use should encompass the total educational community: library, business office, counseling office, drafting department, etc.

10. Thoughtful selection of relevant materials is important.

11. Quality of motivation, assignments, and directions provided by the instructional staff are important.

12. When forced to choose between materials on microform and the usual printed materials, the latter will generally be chosen.

13. Microform systems are economically essential in providing the necessary information to support contemporary curriculums.

14. Microforms are generally used only for reference purposes.

15. Lack of a truly portable viewer, more than anything else, retards the educational use of micrographics.

VI. ROSTER OF PARTICIPANTS

Statement

The General Chairman of the conference thanked all of the participants for their contributions to the sessions throughout this meeting. It was gratifying that the attendees pursued the task at hand, without ceasing, up to the hour of closing; such interest and concern by all of them should produce beneficial results. The exchange of ideas brought about by their meeting together may help others, also, in finding workable solutions to problems posed by the increased use of microforms.

At the close of the conference the participants expressed their appreciation to the U. S. Office of Education for supporting this timely and beneficial meeting in their behalf, and to their hosts at University of Denver who arranged it.

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